

Annex 1: Measurement diagrams 22-1-0076802T12a-A1

Number of pages:	80	Date of Report:	2022-Nov-07
Testing company:	CETECOM GmbH Im Teelbruch 116 45219 Essen Germany Tel. + 49 (0) 20 54 / 95 19-0 Fax: + 49 (0) 20 54 / 95 19-150	Applicant:	WITTE-Velbert GmbH & Co.KG
Product: Model:	Automotive NFC Outer Door Handle INTTAGEBTP		
FCC ID:	V2T-INTTAGEBTP	IC:	7575A-INTTAGEBTP
Testing has been carried out in accordance with:	FCC Regulations Title 47 CFR, Chapter I, Subchapter A, Part 15, Subpart C §15.225 ISED Regulations RSS-Gen, Issue 5 + Amendment 2 RSS-210, Issue 10 Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".each section under "Test method and limit".		

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1 Measurement diagrams

1.1 Radiated field strength emissions and emission mask

2.01a_SpektrumMask_TX_OpMode1_Setup1_EUT_standing

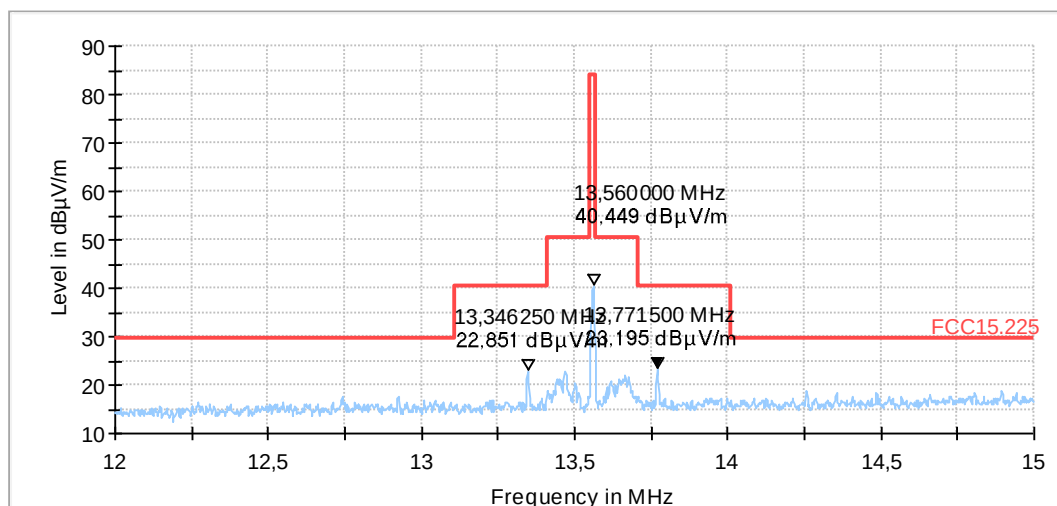
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous mode without tag
Environmental Conditions::	Humidity : 62%rH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S16_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



2.02a_SpektrumMask_TXRX_OpMode2_Setup2_EUT_standing

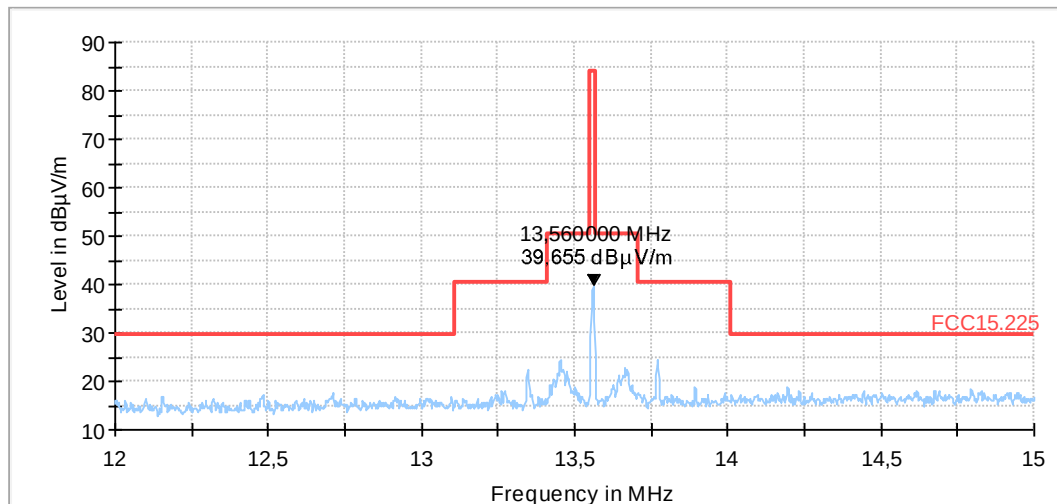
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous communication with tag
Environmental Conditions:	Humidity : 62%rH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S17_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



1.2 Radiated field strength emissions below 30 MHz

2.03a_RSE_TX_OpMode1_Setup1_EUT_standing

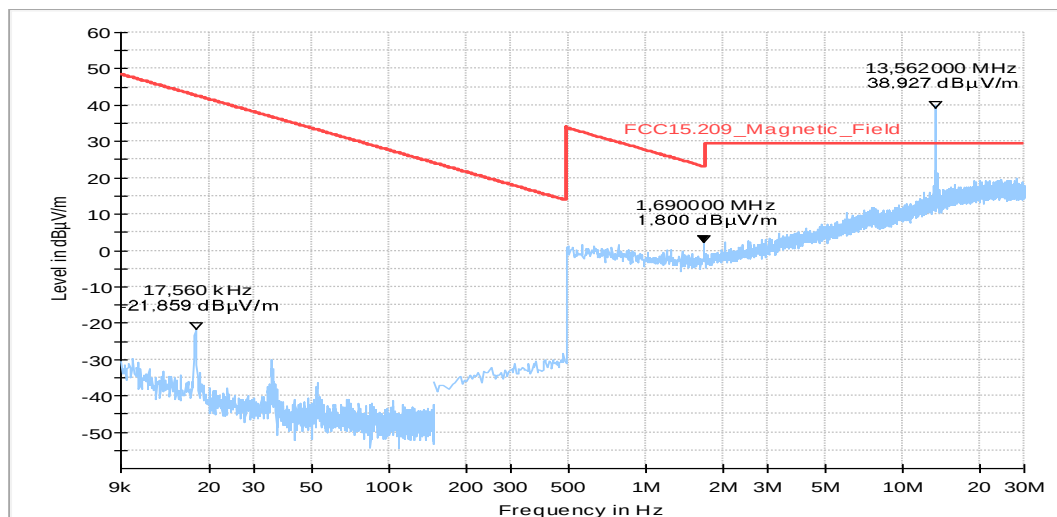
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous mode without tag
Environmental Conditions:	Humidity : 62%rH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S16_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



Remark: emissions in the lower frequency range are external interferer caused by an electrical antenna mast inside the chamber

2.03b_RSE_TX_OpMode1_Setup1_EUT_laying

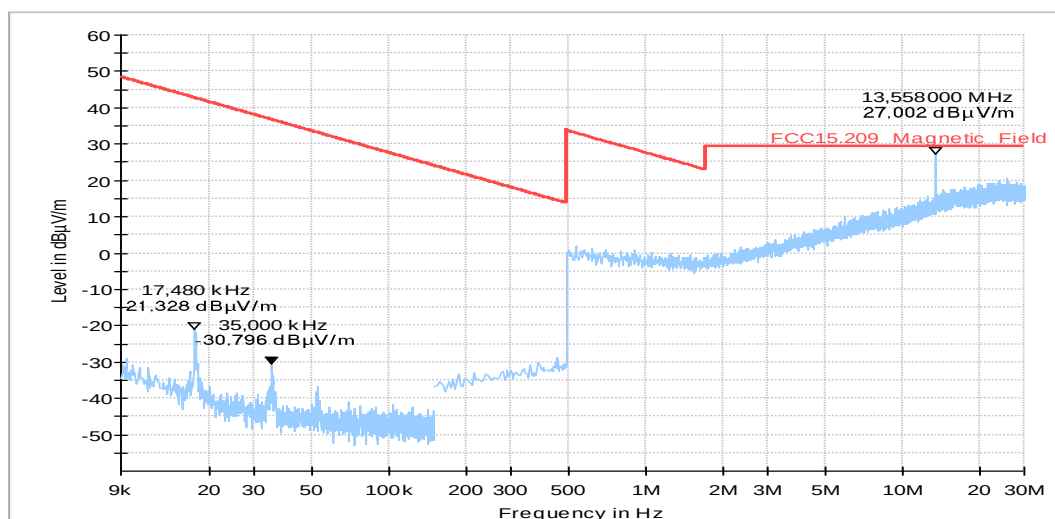
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous mode without tag
Environmental Conditions:	Humidity : 62%rH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S16_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



Remark: emissions in the lower frequency range are external interferer caused by an electrical antenna mast inside the chamber

2.04a_RSE_TXRX_OpMode2_Setup2_EUT_standing

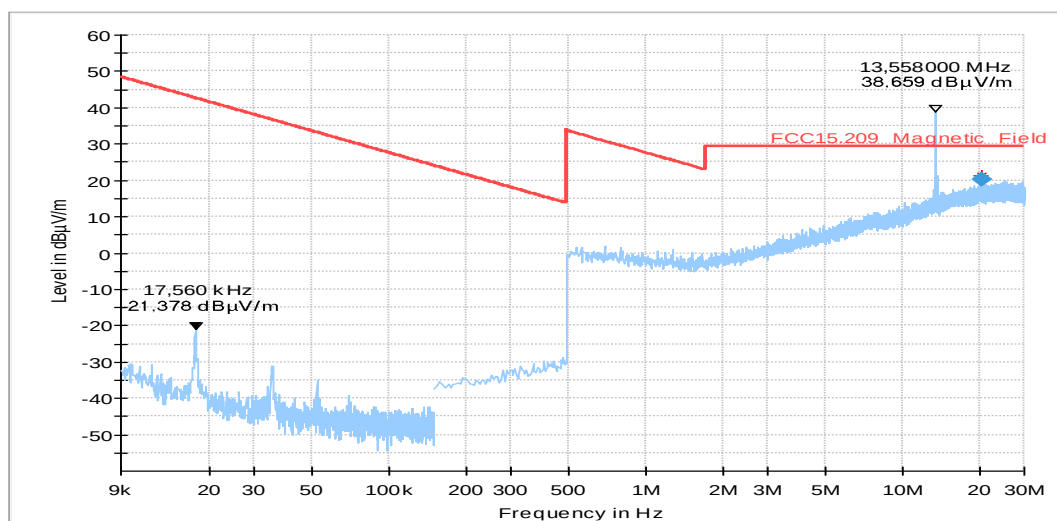
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous communication with tag
Environmental Conditions::	Humidity : 62%rH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S17_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



Remark: emissions in the lower frequency range are external interferer caused by an electrical antenna mast inside the chamber

2.04b_RSE_TXRX_OpMode2_Setup2_EUT_laying

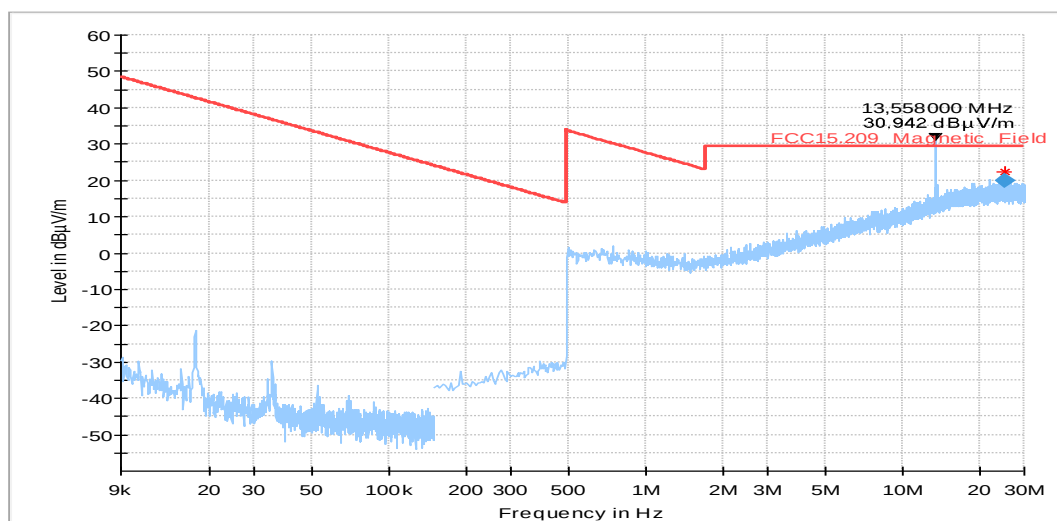
Common Information

Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used Filter:	bypass
Test Standard:	FCC 15.225 § 15.209; RSS-210: Issue 10 RSS-Gen: Issue 5
Operator:	Lor
Operating Mode:	NFC continuous communication with tag
Environmental Conditions::	Humidity : 62%rH; Temperature: 22°C
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S17_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

Full Spectrum



Remark: emissions in the lower frequency range are external interferer caused by an electrical antenna mast inside the chamber

1.3 Radiated field strength emissions 30 MHz – 1 GHz

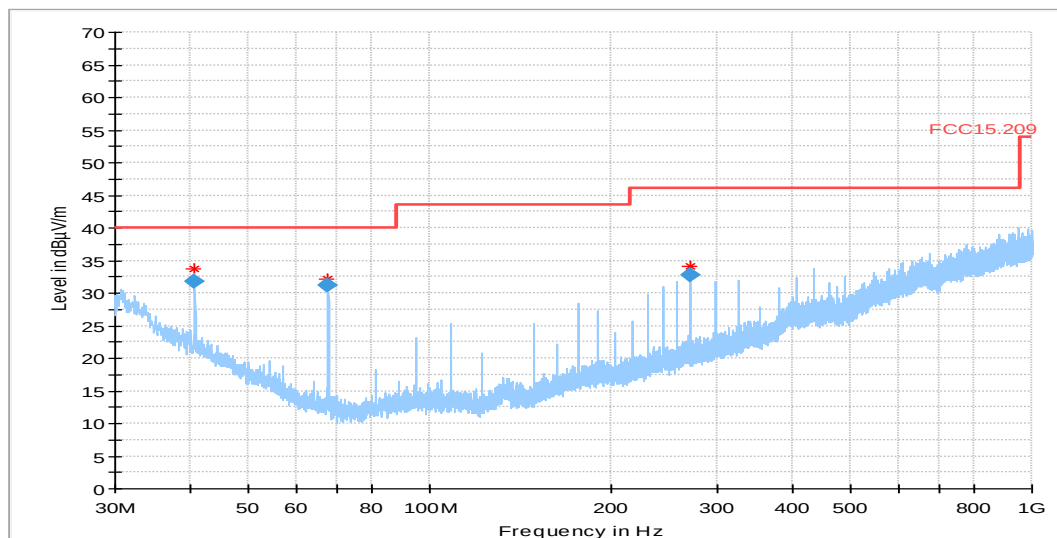
3.01a_RSE_TX_OpMode1_Setup1_EUT_standing

Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205&15.209 & RSS Gen. Issue 5
Antenna polarisation:	horizontal/vertical
Environmental Conditions::	Humidity : 59%rH; Temperature: 22°C
Operator Name:	Lor
EUT:	S05
Operating Mode:	NFC Test-Mode CW
Power supply:	12v DC car battery
Comment:	Channel no. nominal
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S16_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Trd Corr. (dB/m)
40.670000	31.79	40.00	8.21	120.000	105.0	V	63.0	16.2	0.0	15.6
67.790000	31.25	40.00	8.75	120.000	154.0	V	176.0	6.5	0.0	5.7
271.190000	32.65	46.00	13.35	120.000	111.0	H	334.0	14.4	0.0	12.8

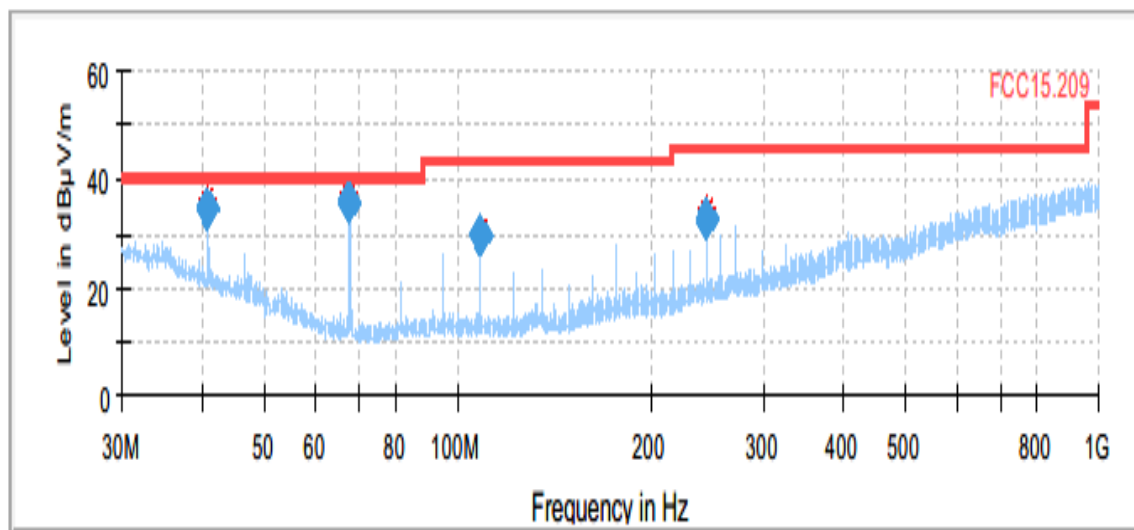
3.02a_RSE_TXRX_OpMode2_Setup2_EUT_standing

Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205&15.209 & RSS Gen. Issue 5
Antenna polarisation:	horizontal/vertical
Environmental Conditions::	Humidity : 58%rH; Temperature: 22°C
Operator Name:	Lor
EUT:	S11
Operating Mode:	NFC normal mode, communicating to NFC-Tag
Power supply:	12v DC car battery
Comment:	Channel no. nominal
Verdict:	Passed

EUT Information

PMT number:	22-1-00768S17_C01
Manufacturer:	WITTE-Velbert GmbH & Co.KG
Power Supply:	12V DC
Comments:	car battery powered

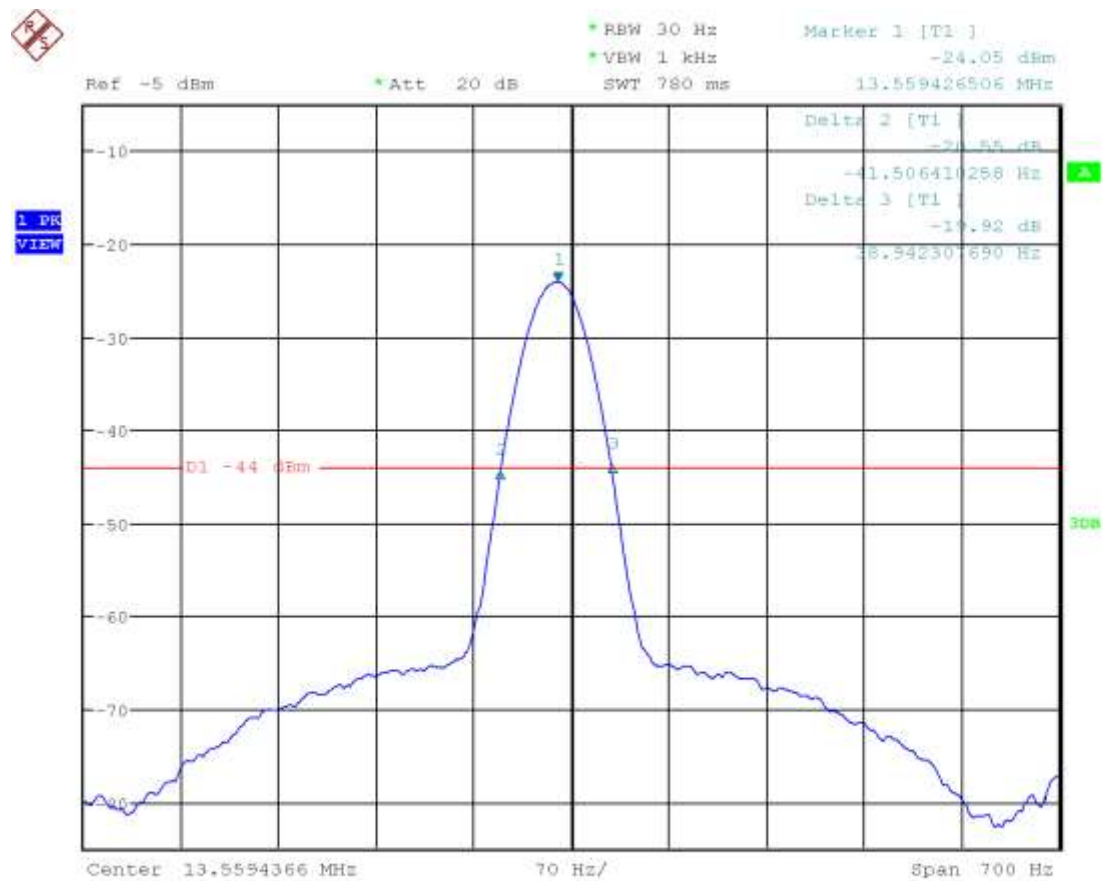


Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Trd Corr. (dB/m)
40.670000	34.56	40.00	5.44	120.000	105.0	V	78.0	16.2	15.6
67.790000	36.10	40.00	3.90	120.000	125.0	V	251.0	6.5	5.7
108.470000	29.63	43.50	13.87	120.000	109.0	V	130.0	7.7	6.6
244.070000	32.86	46.00	13.14	120.000	120.0	H	205.0	12.9	11.3

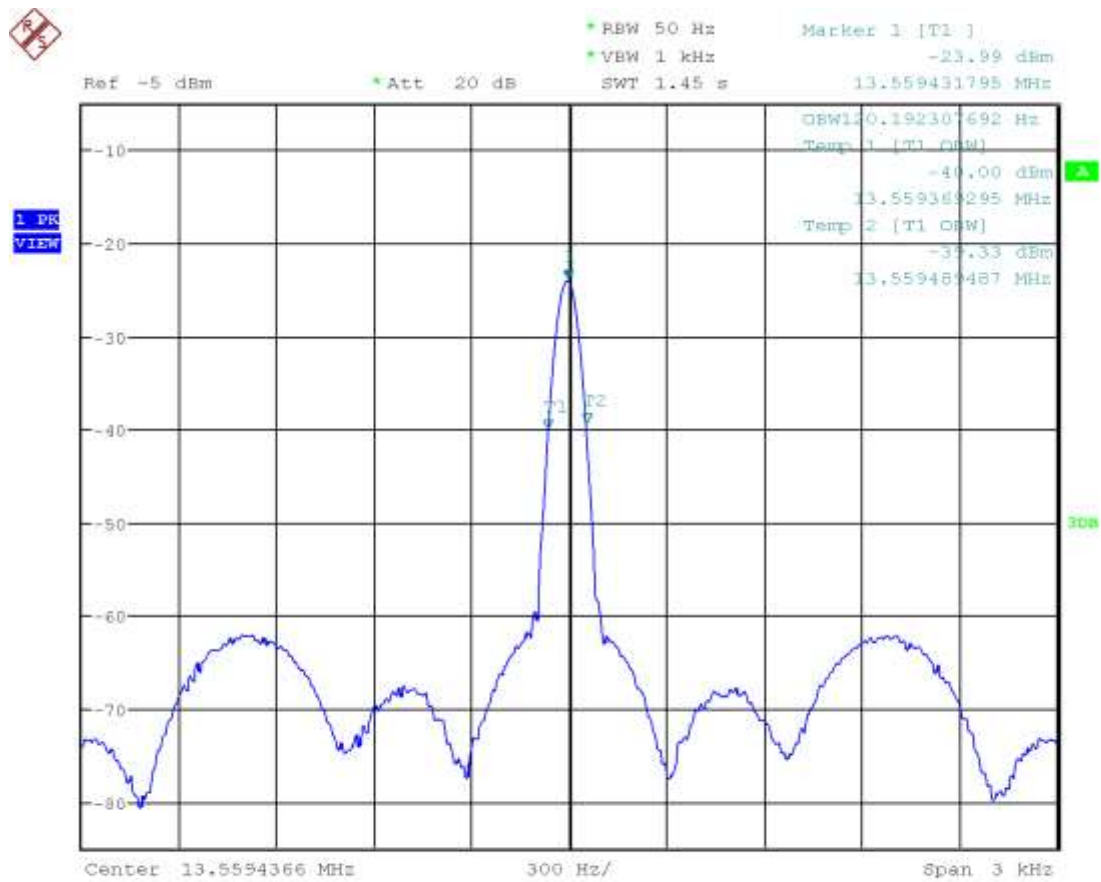
1.4 Occupied Channel Bandwidth

1.4.1 Set1Op1_20dBc



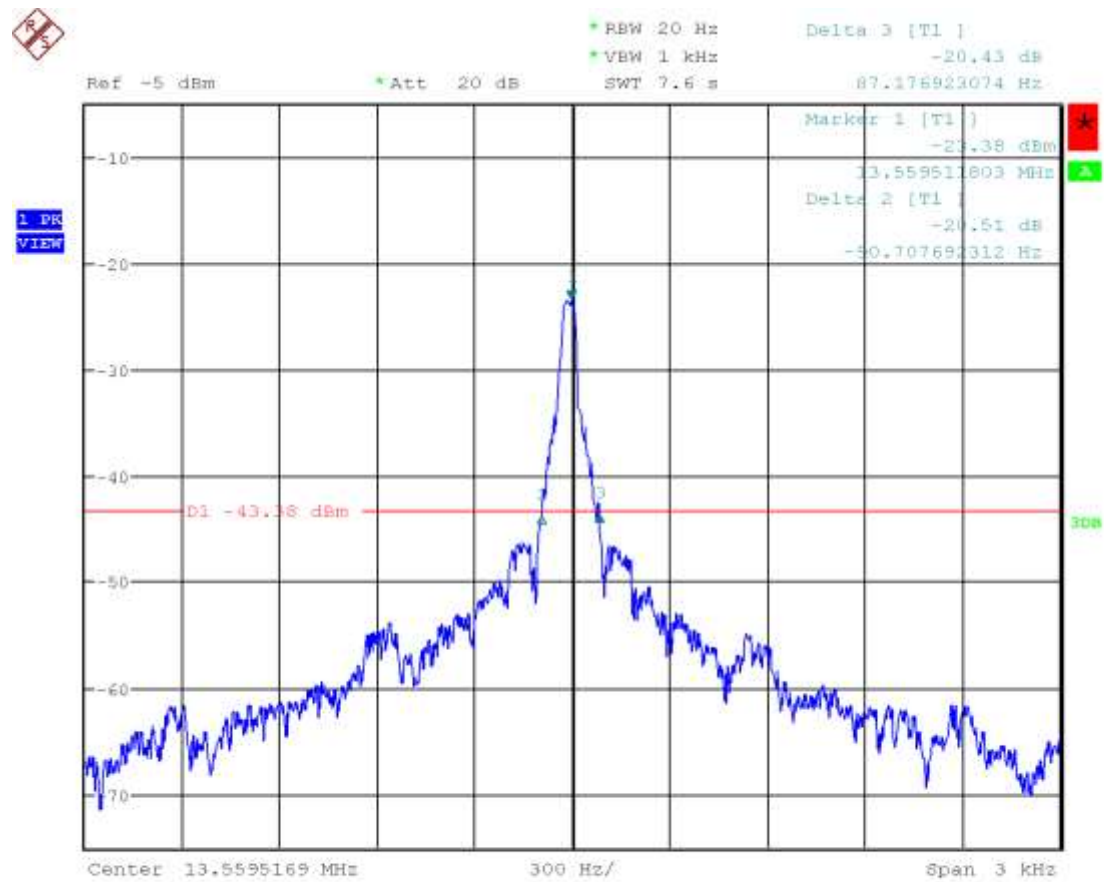
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1.4.2 Set1Op1_99%OBW



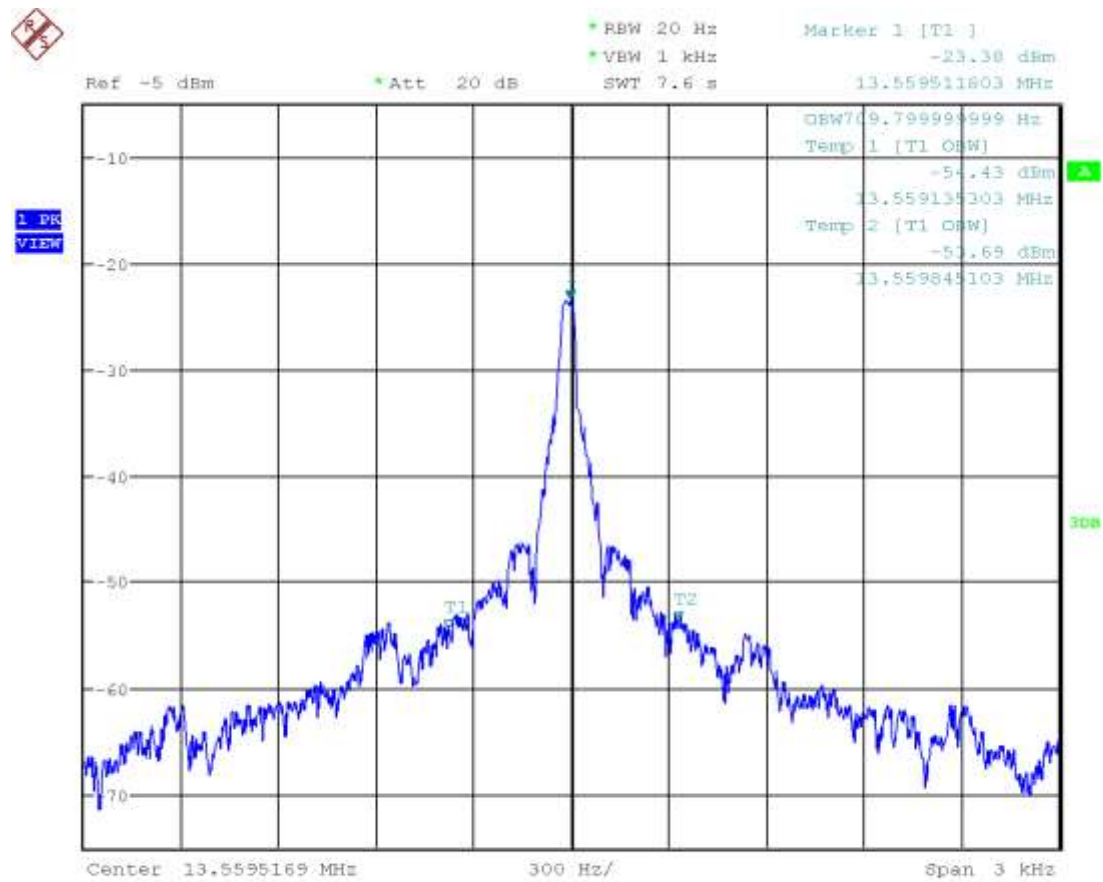
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1.4.3 Set2Op2_20dBc



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1.4.4 Set2Op2_99%OBW

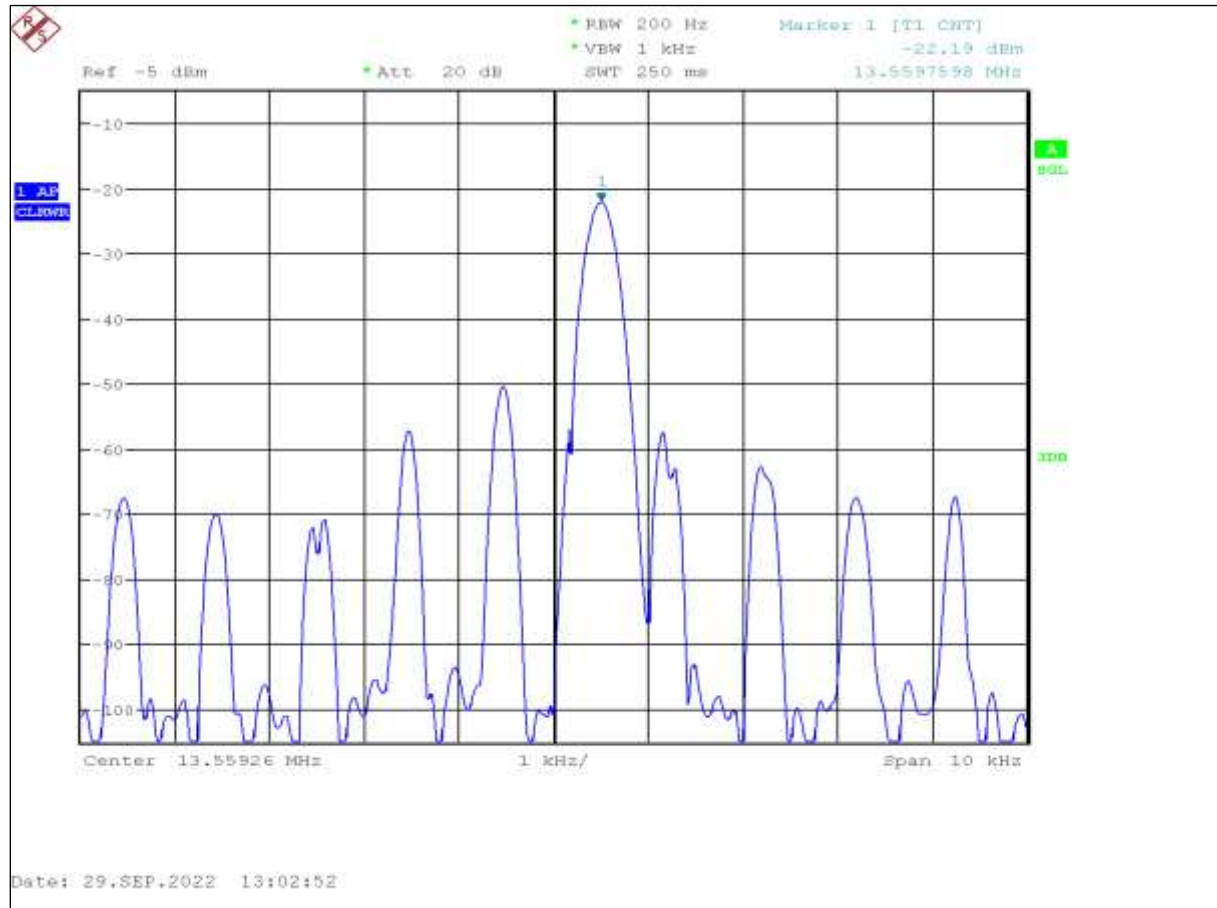


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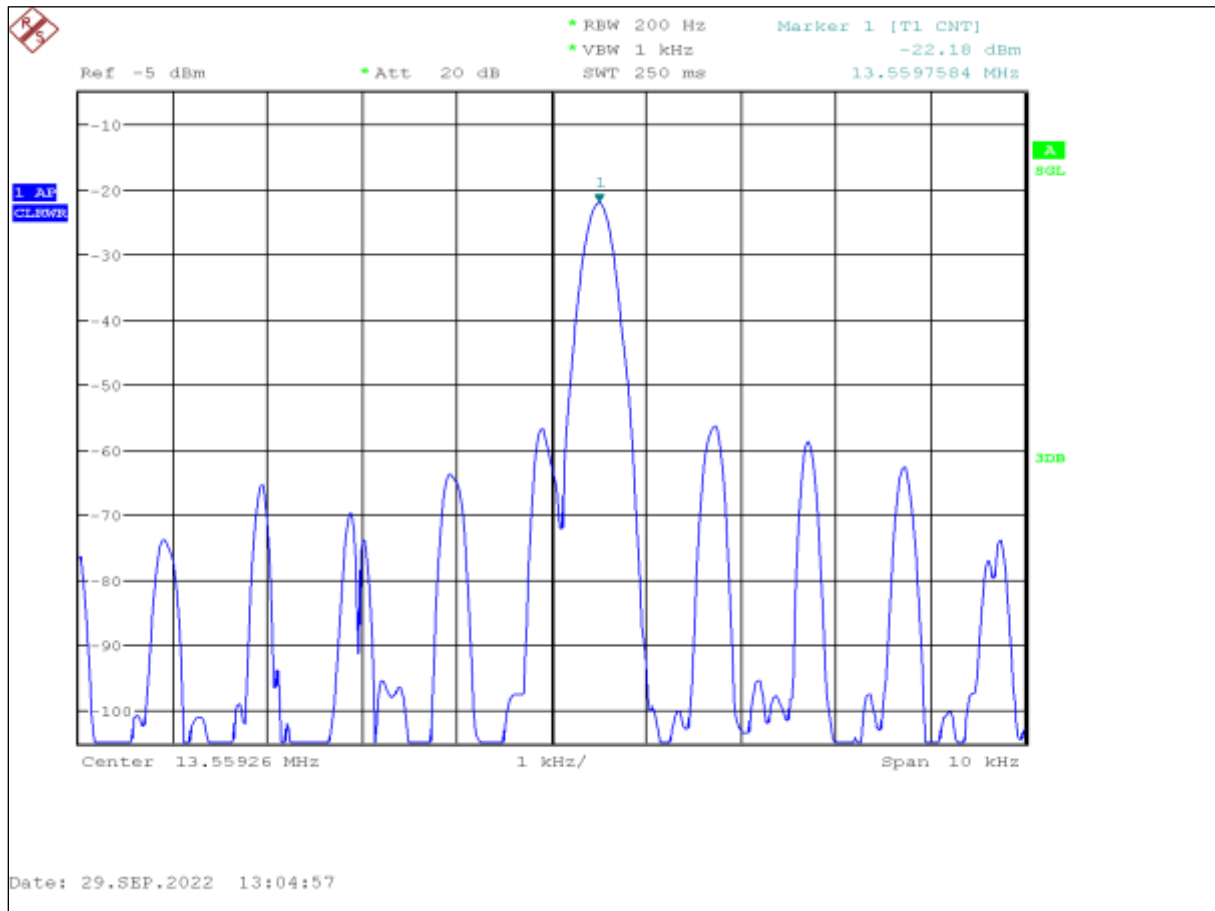
1.5 Frequency stability

1.5.1 Temperature variation

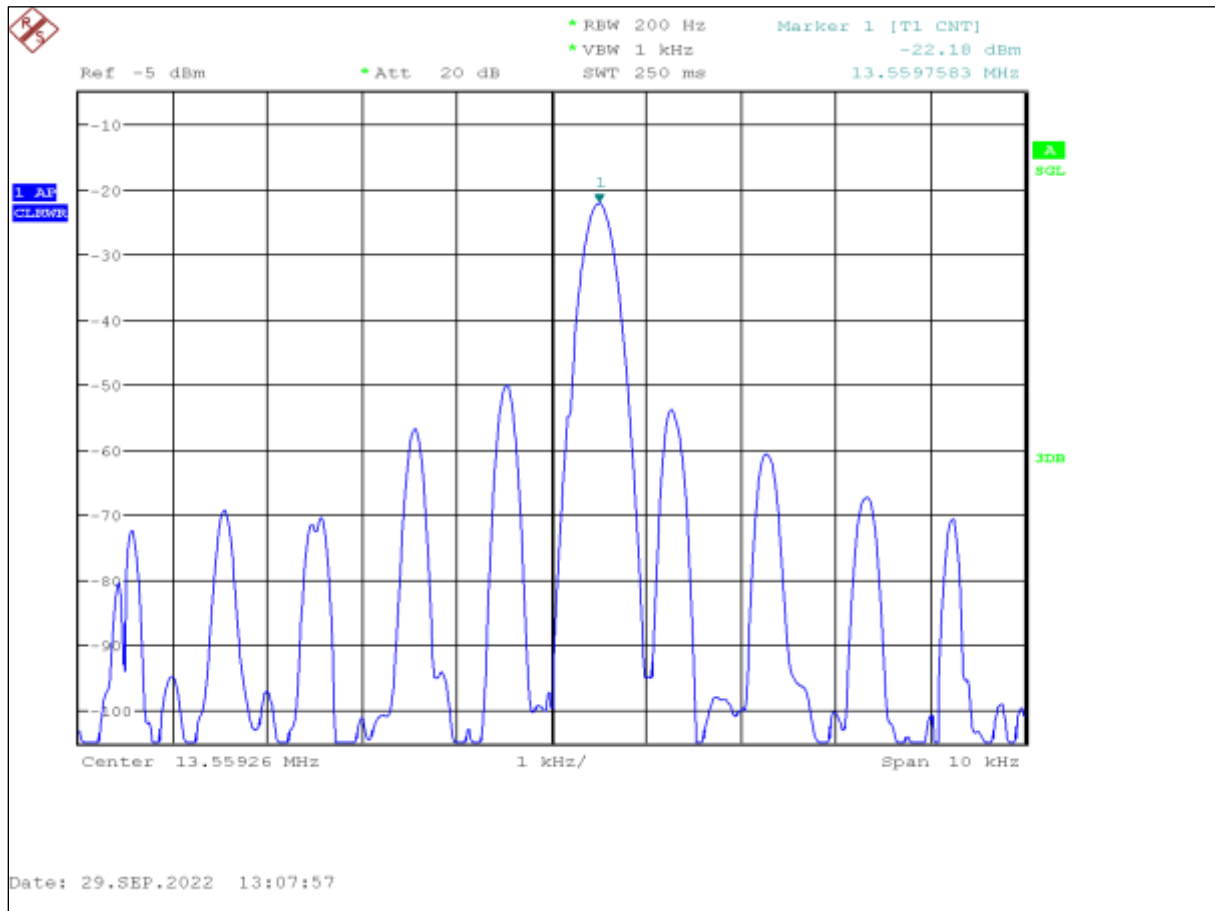
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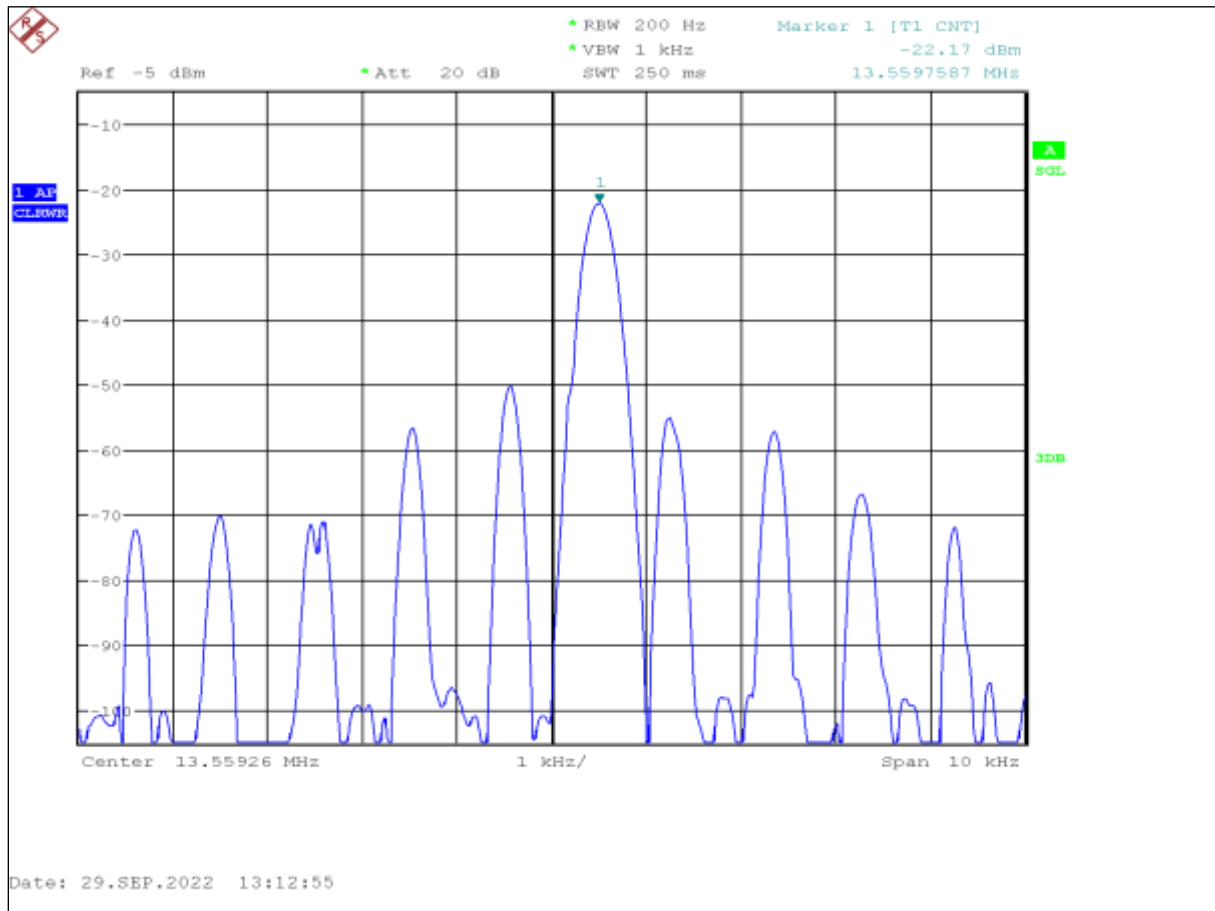
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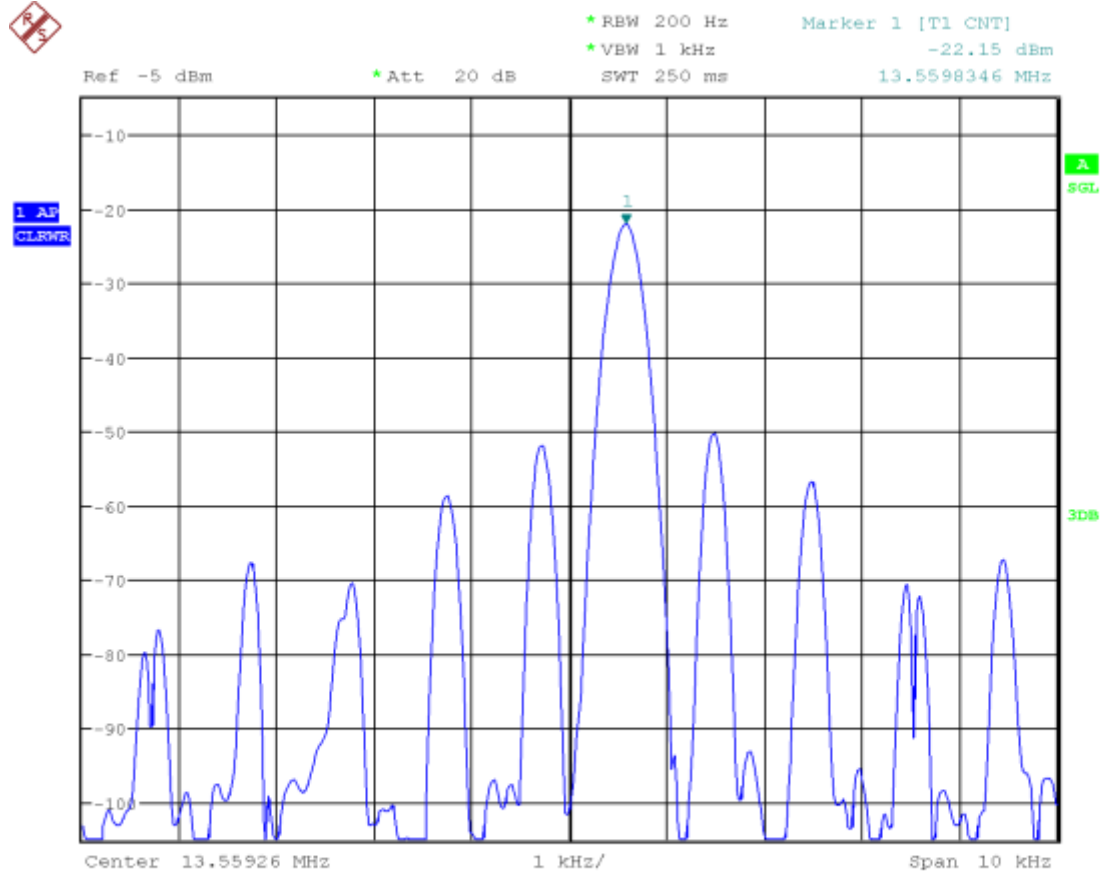
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Tm10_V12_4

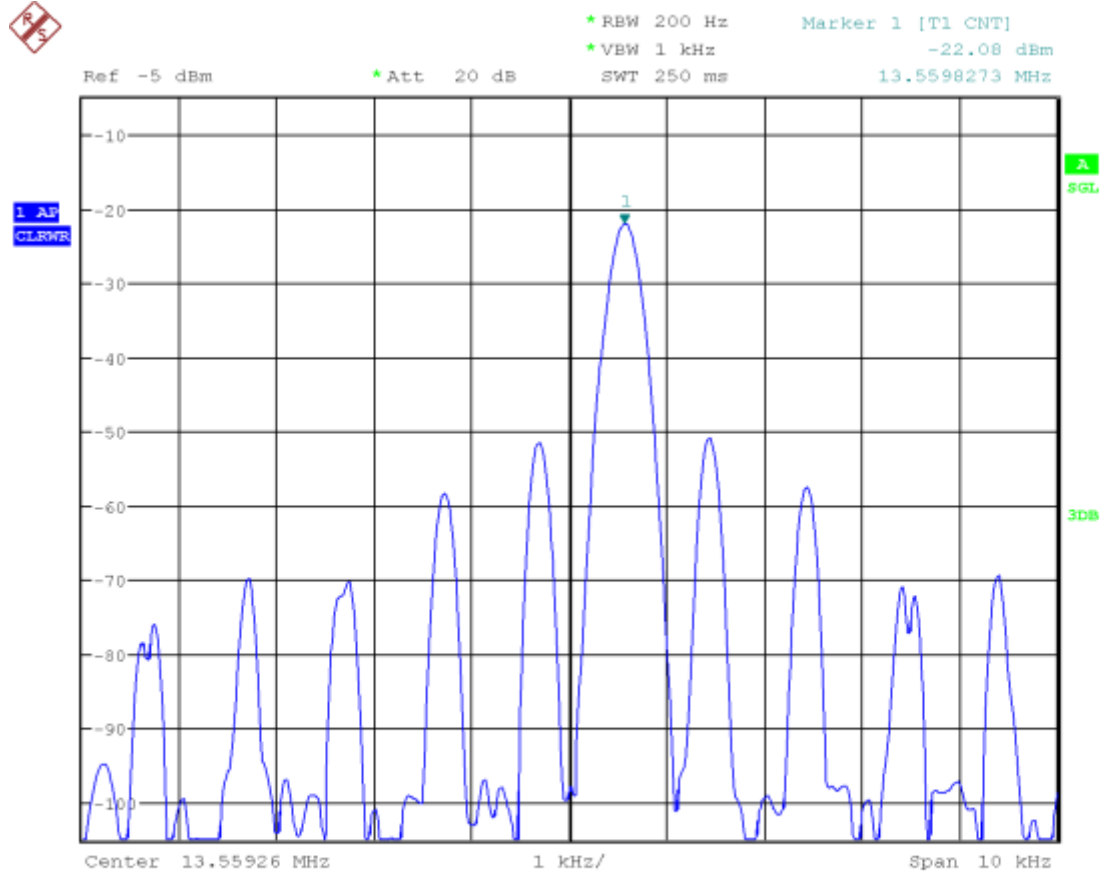


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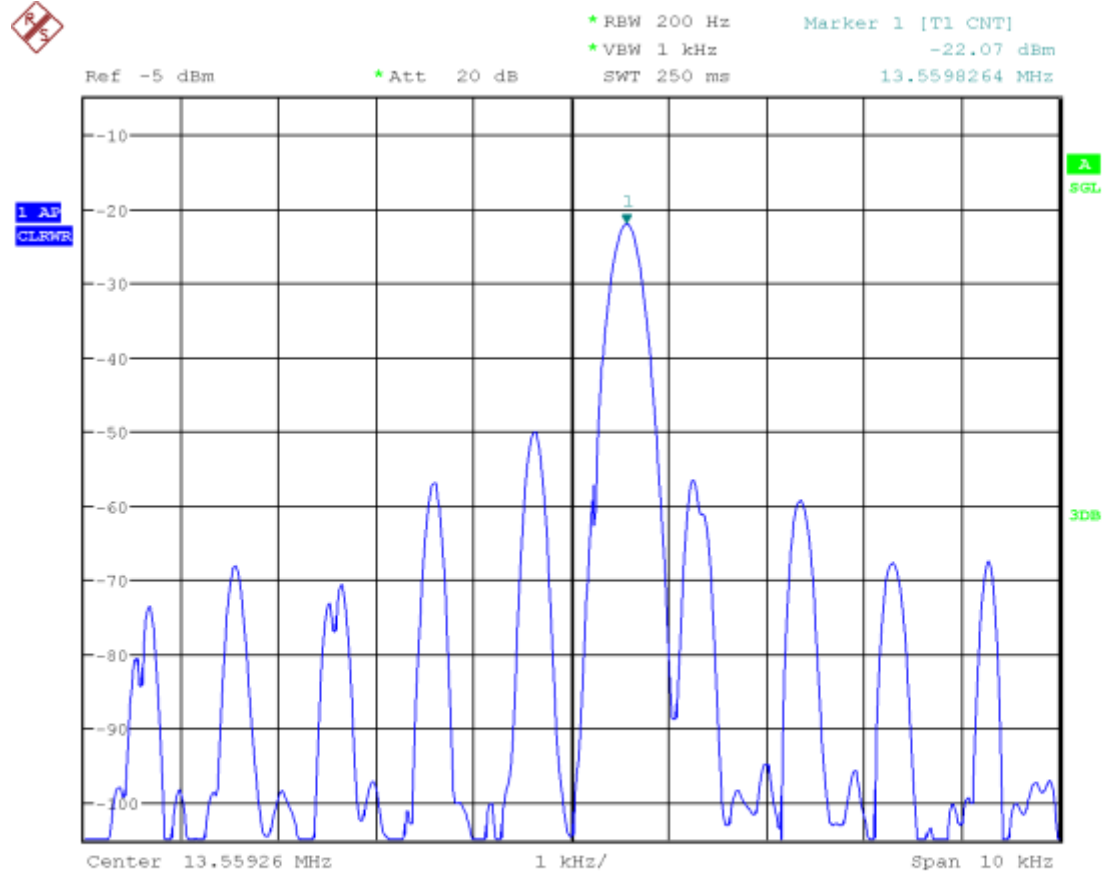
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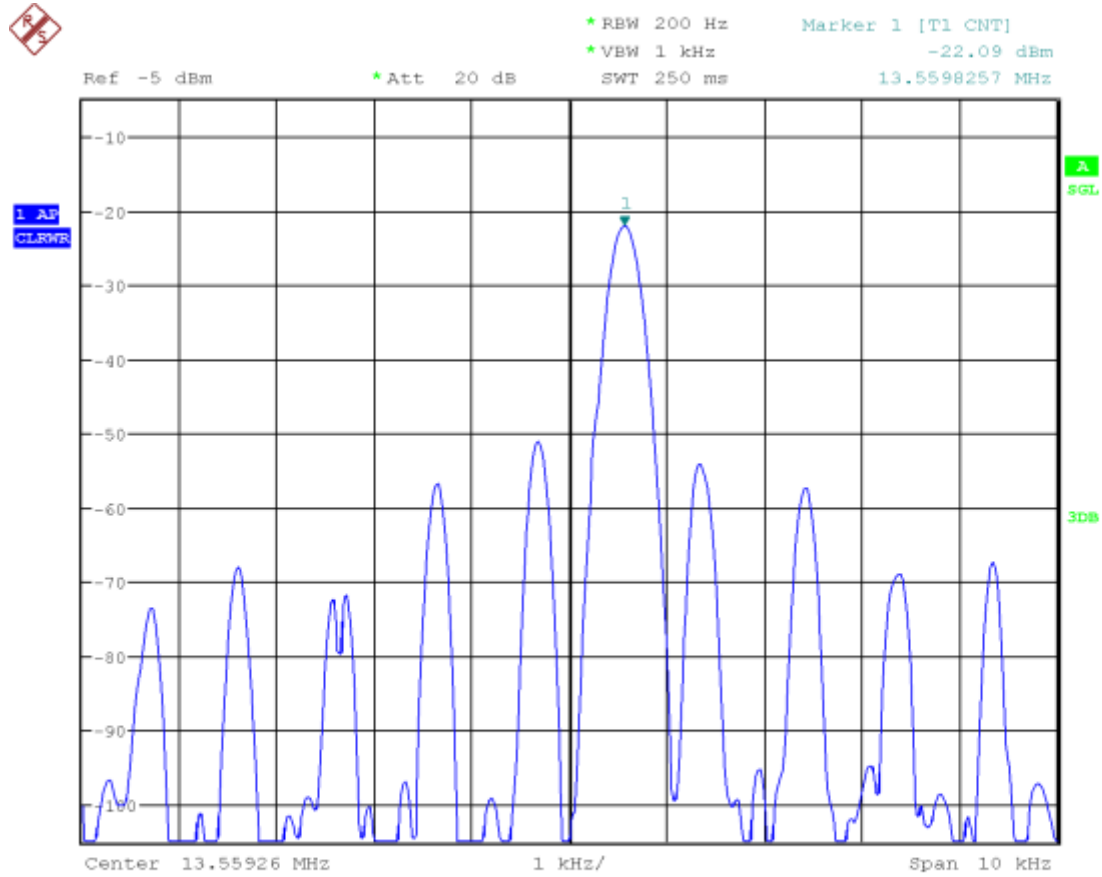
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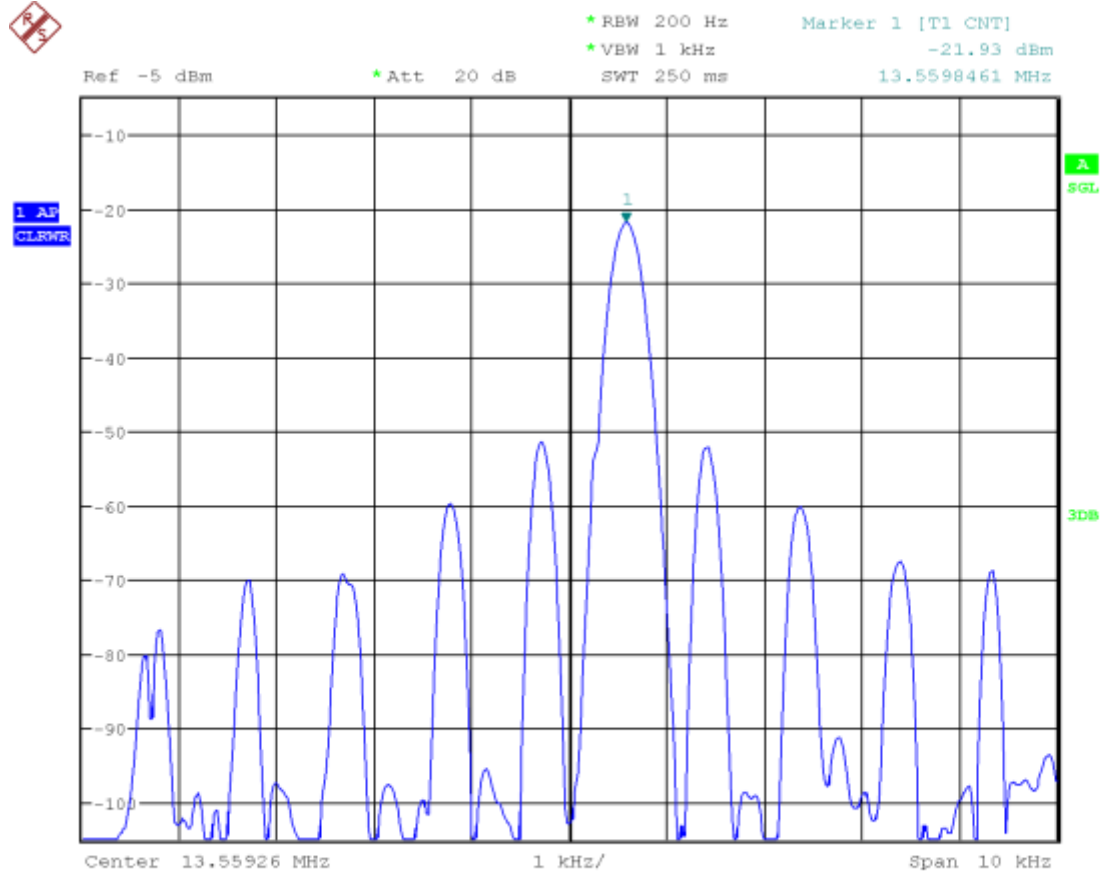
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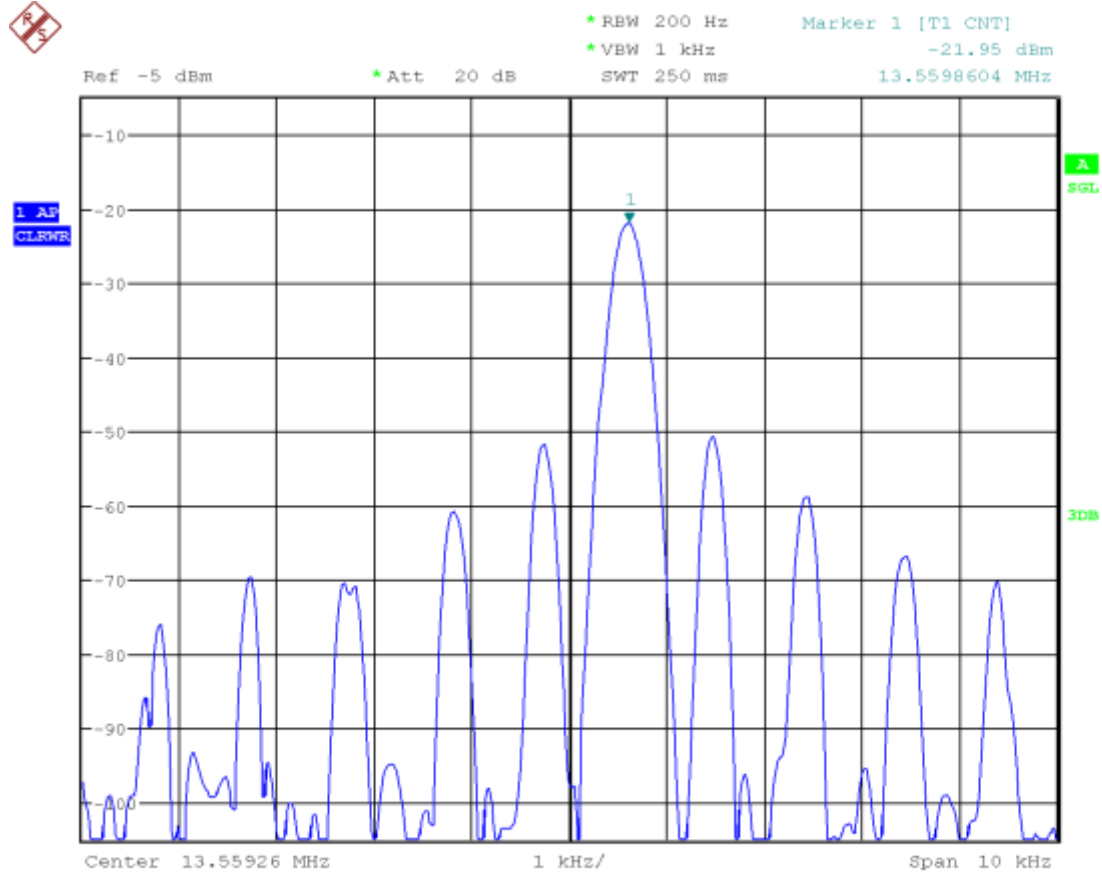
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Tm30_V12_1



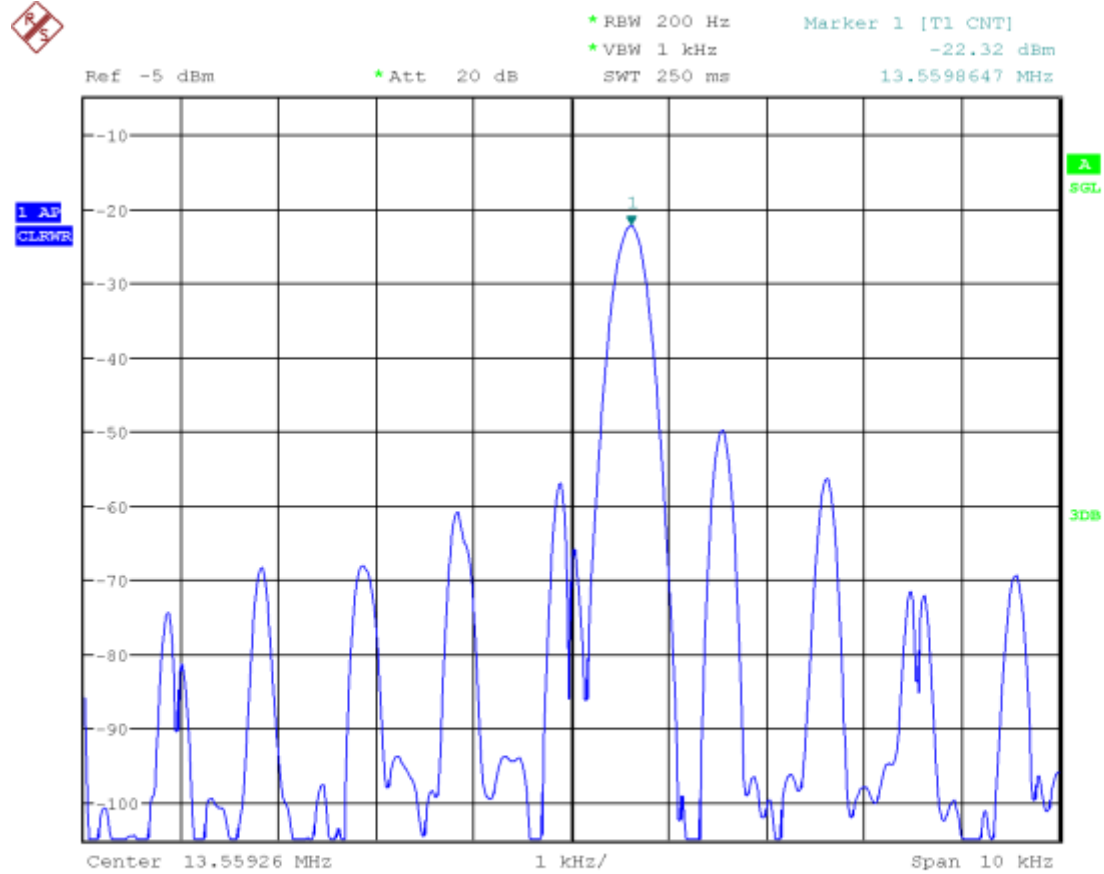
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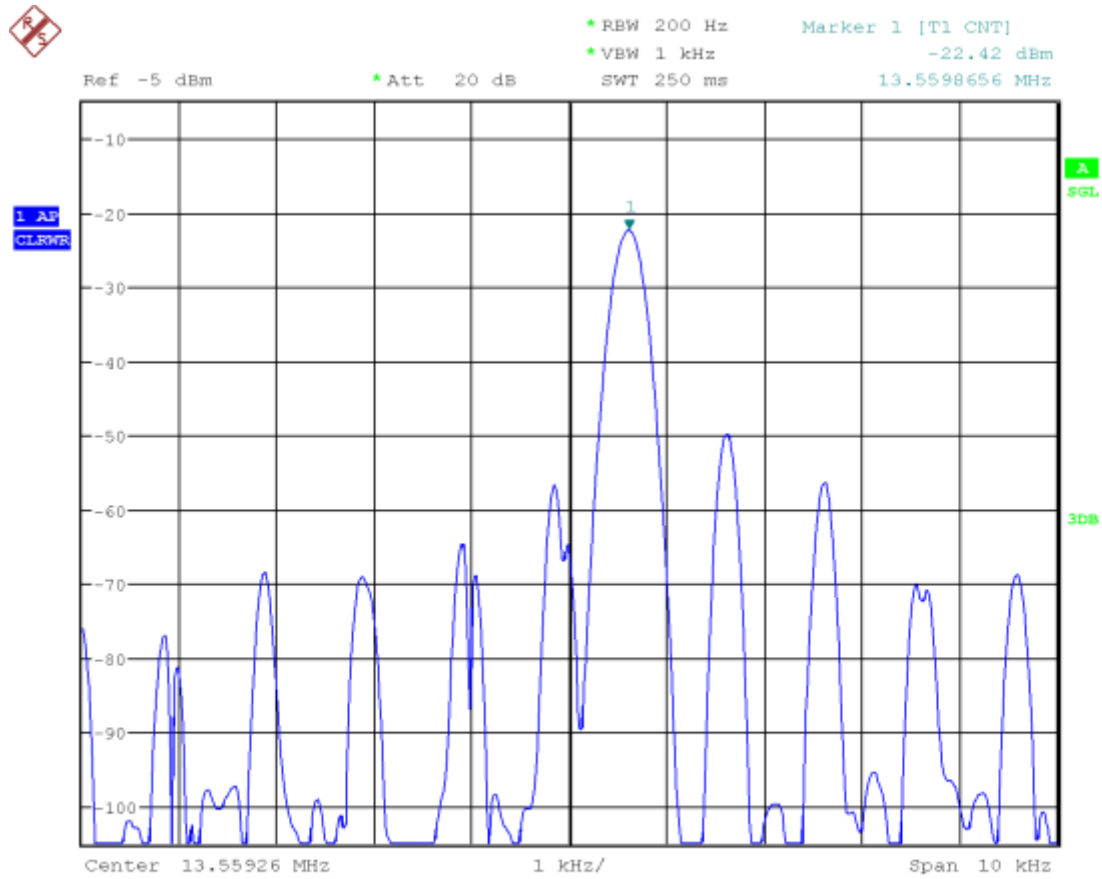
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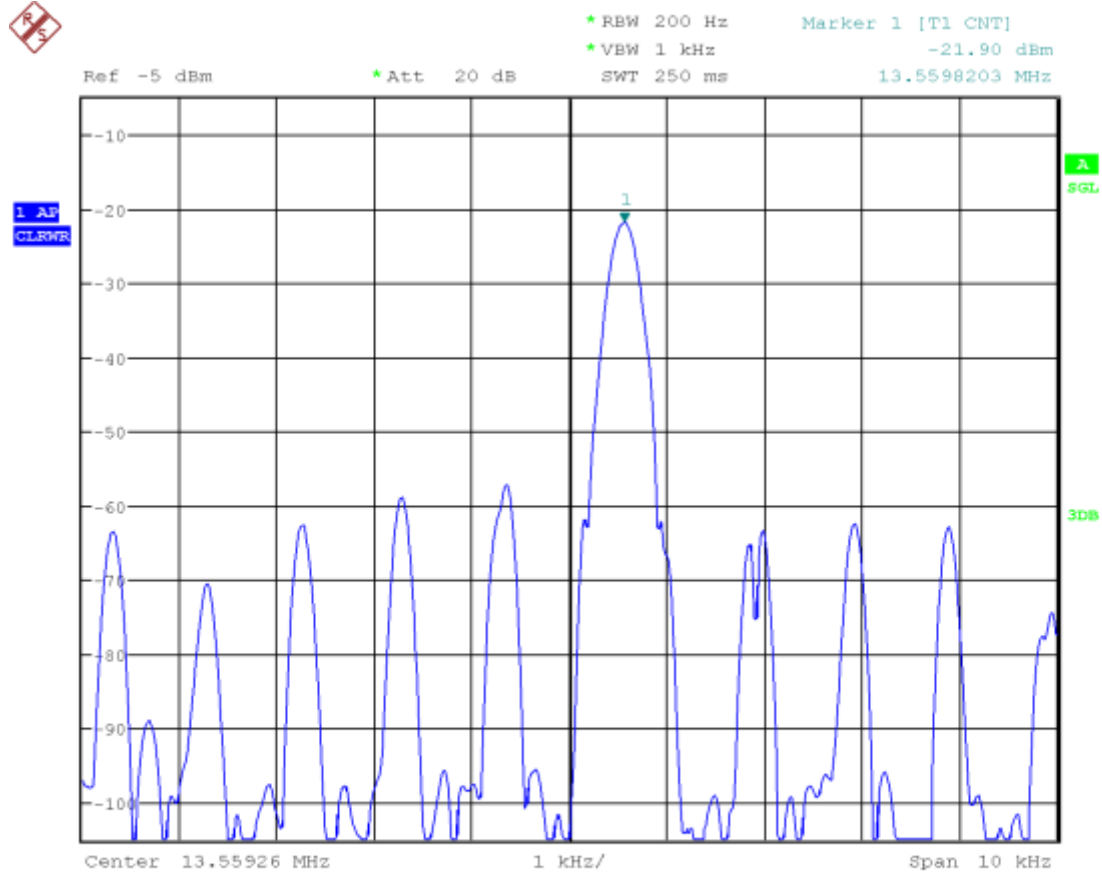
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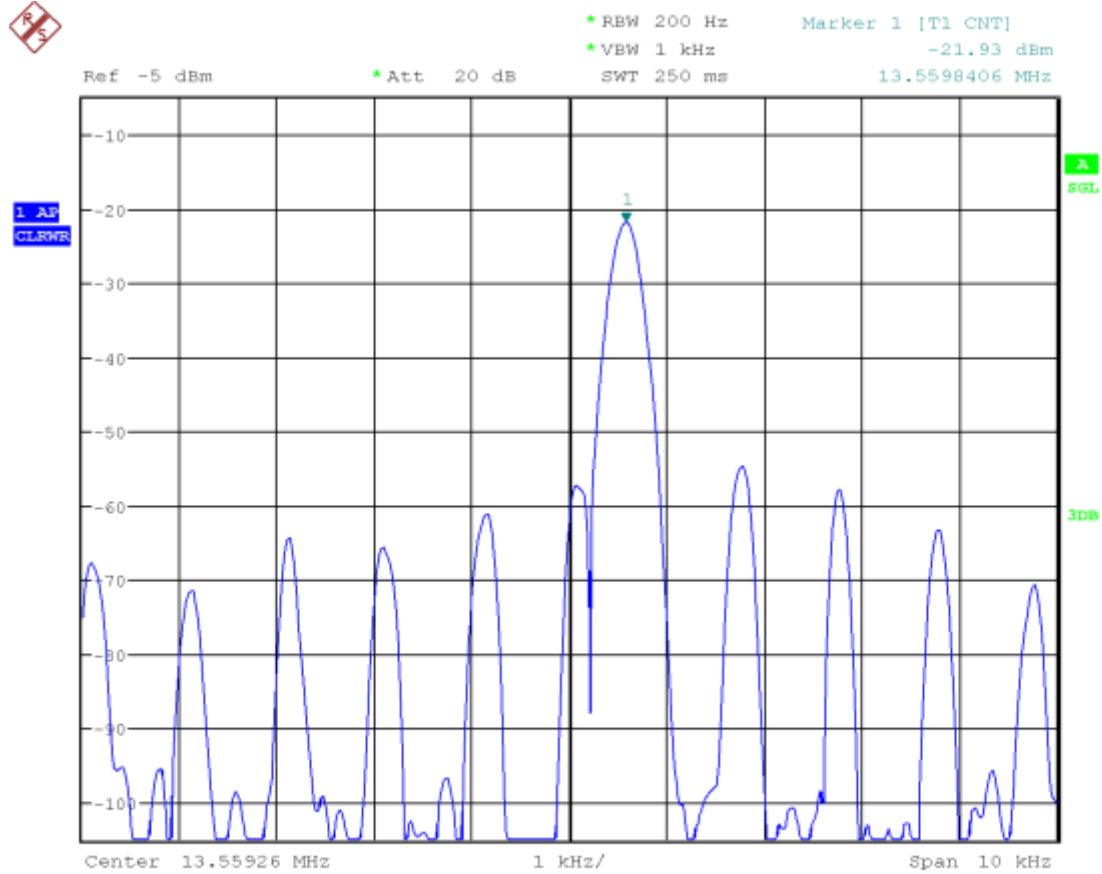
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Tm40_V12_1



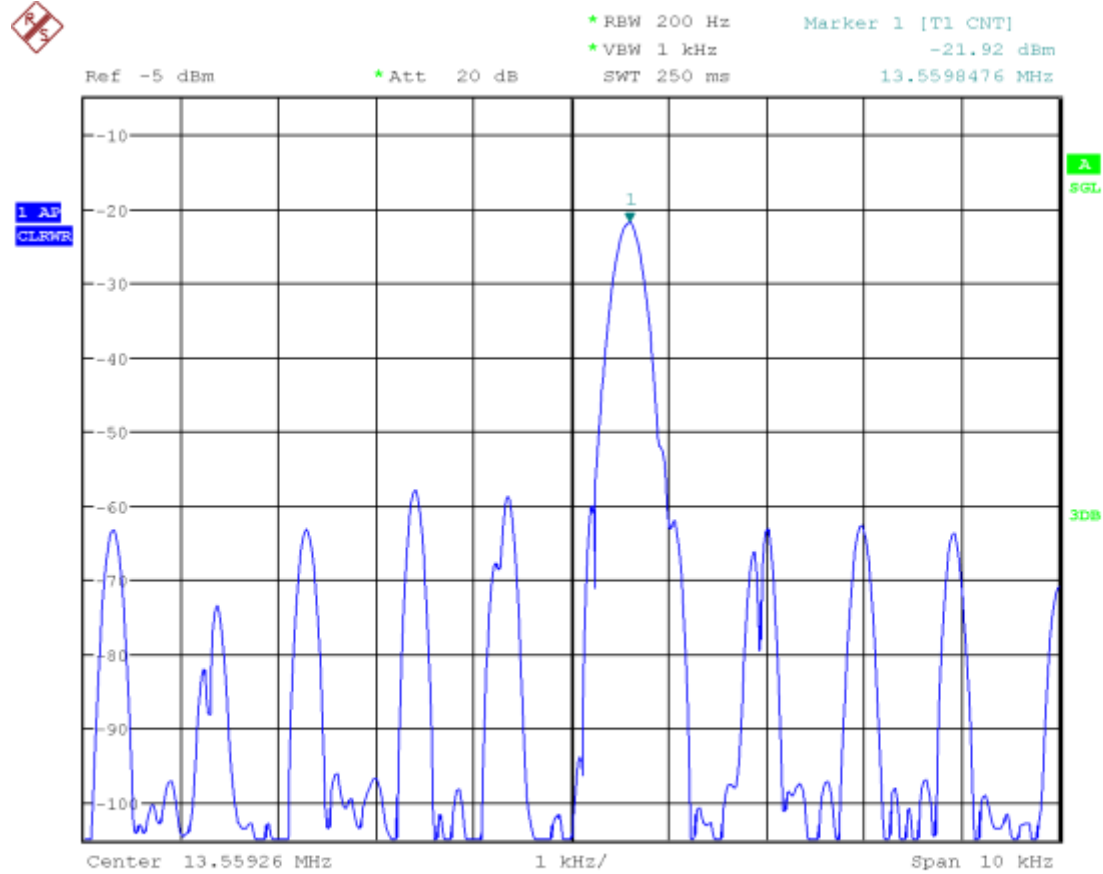
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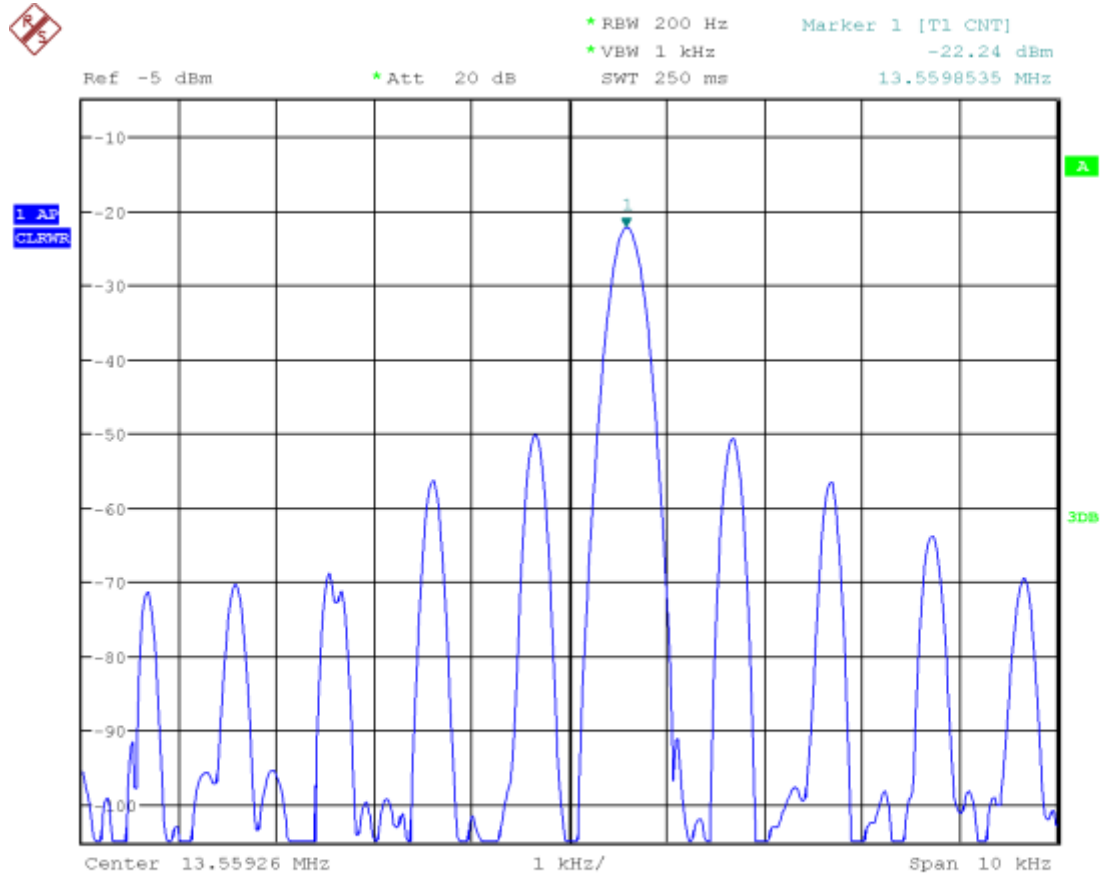
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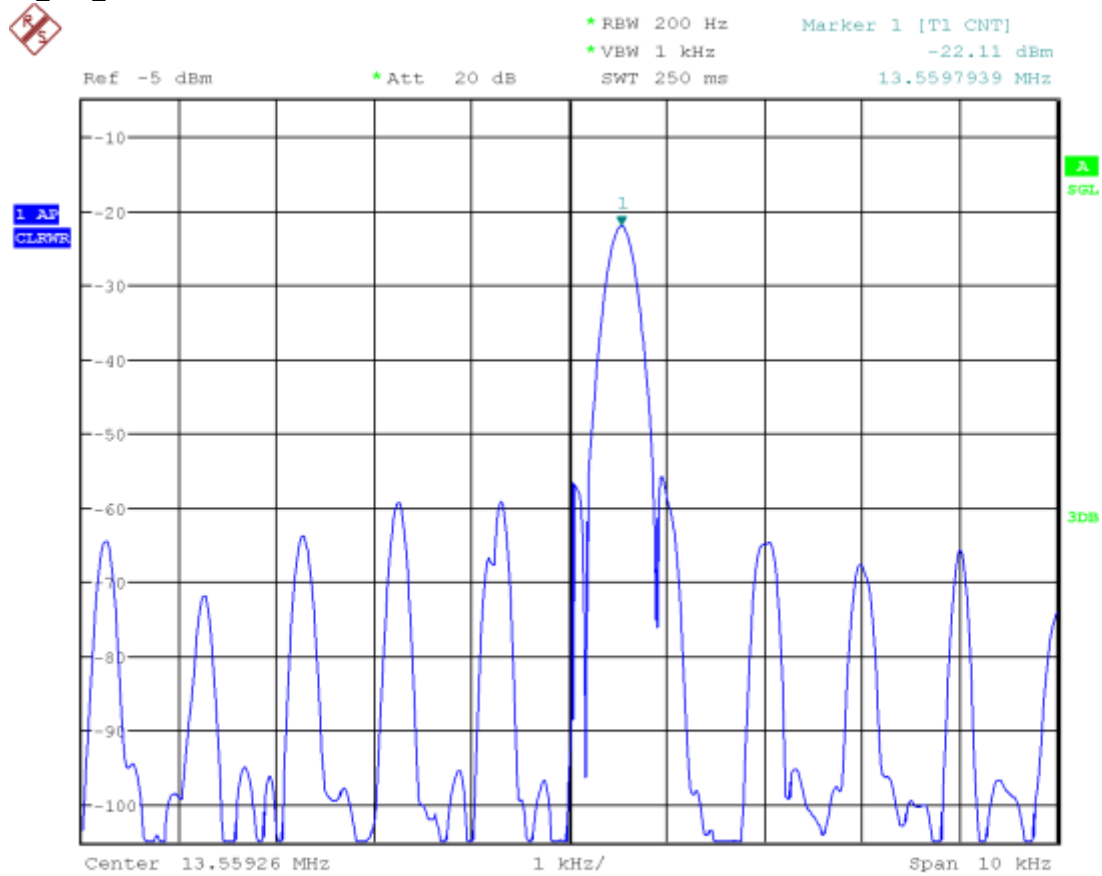
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Tm40_V12_4



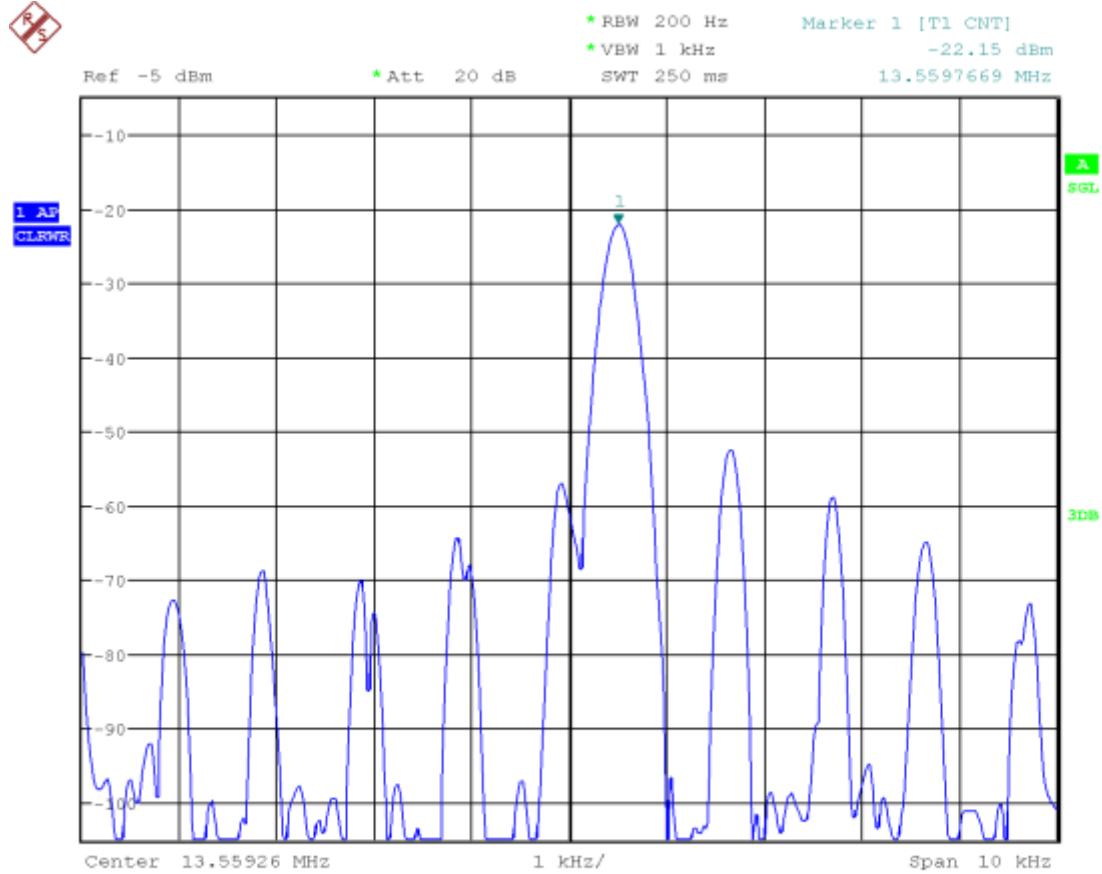
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T0_V12_1



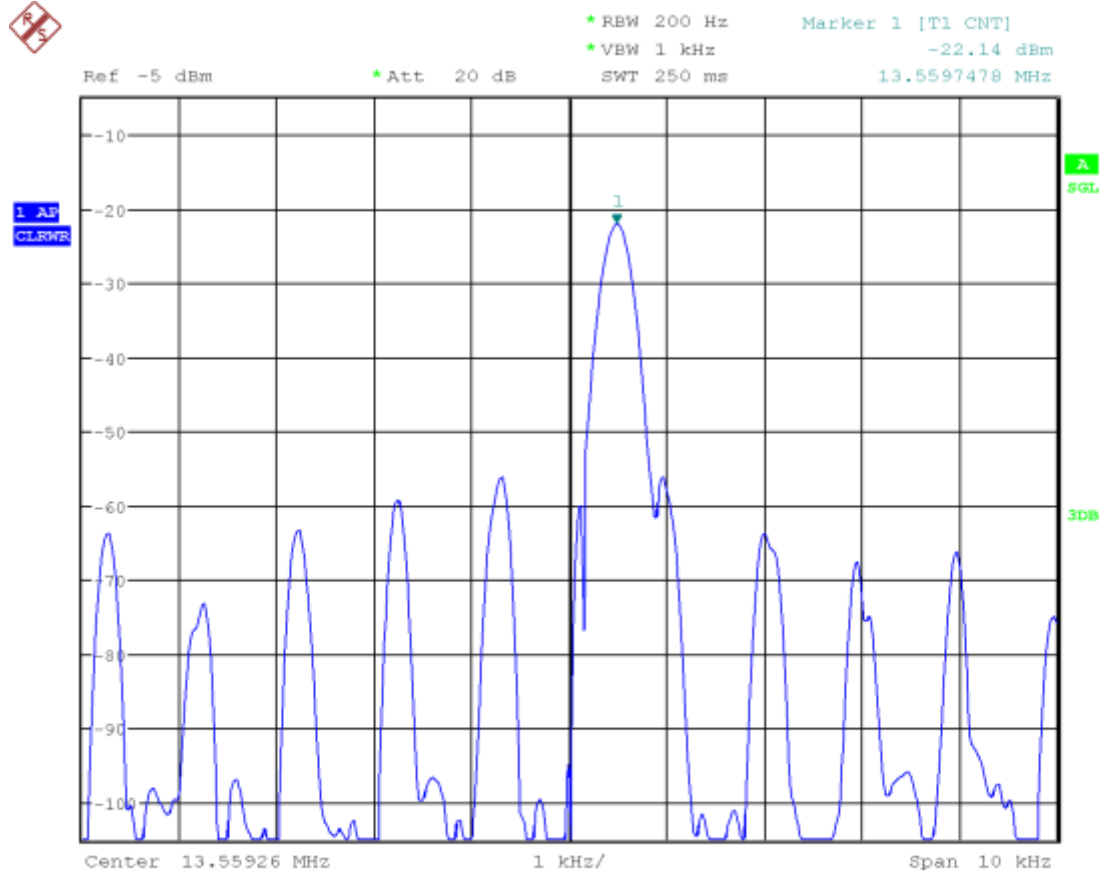
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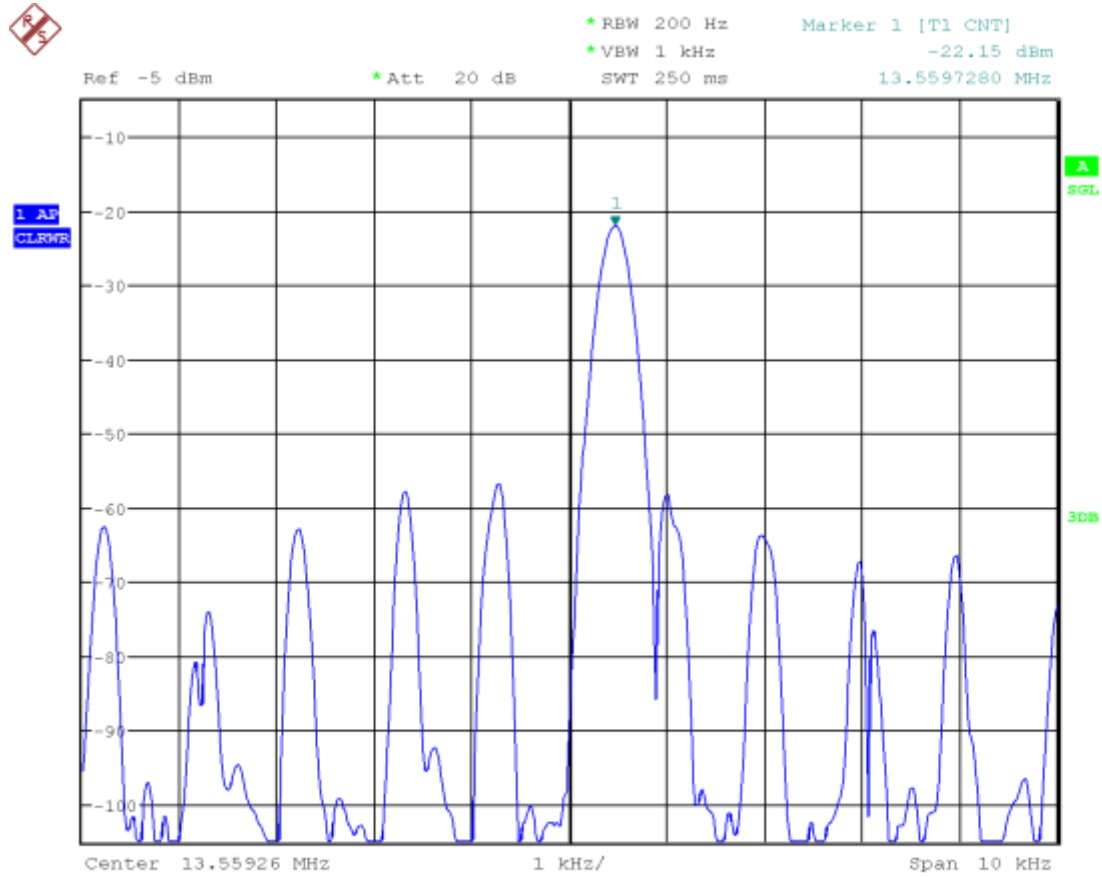
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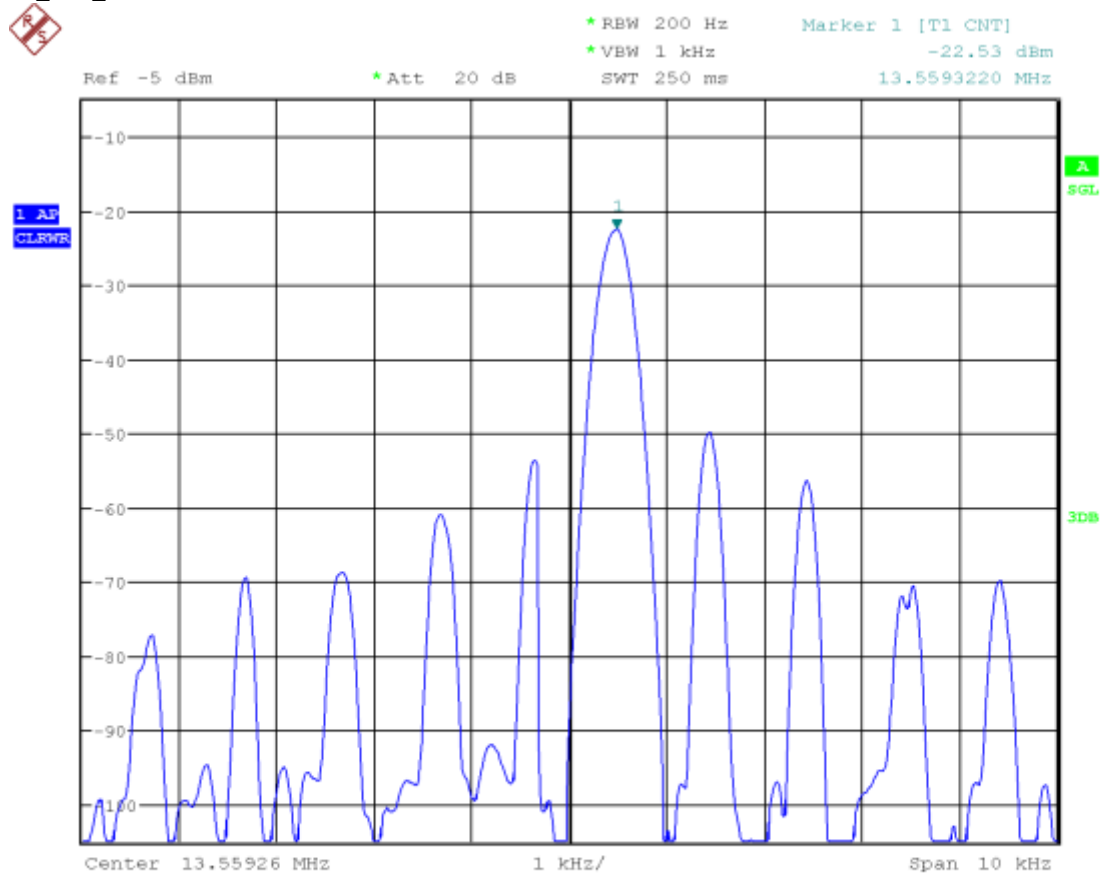
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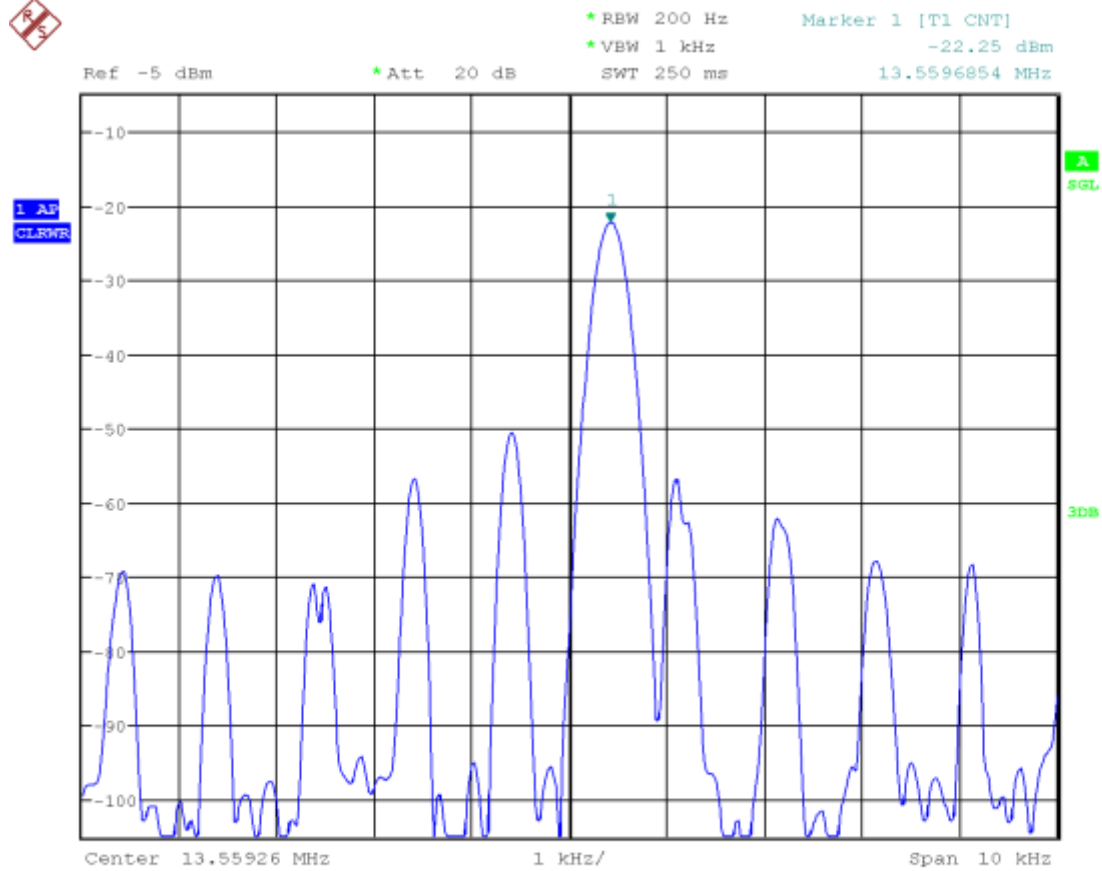
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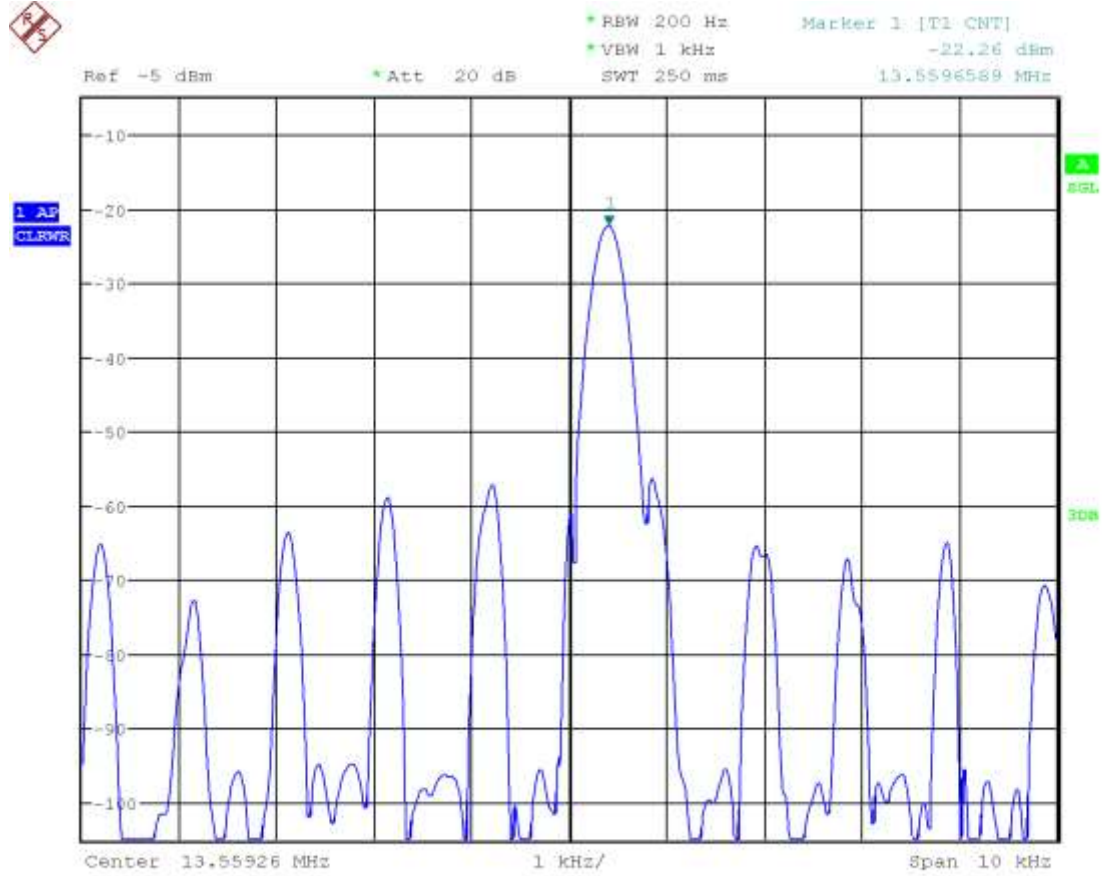
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T0_V12_2



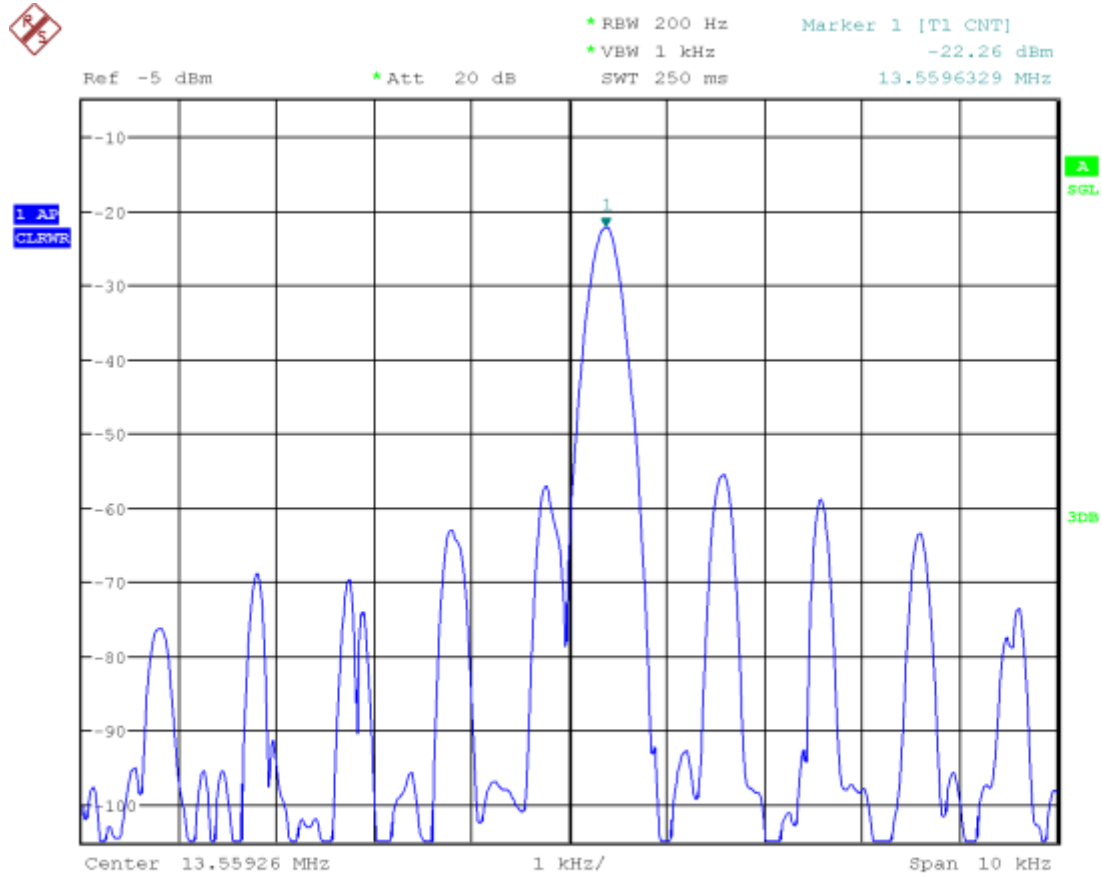
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T0_V12_3



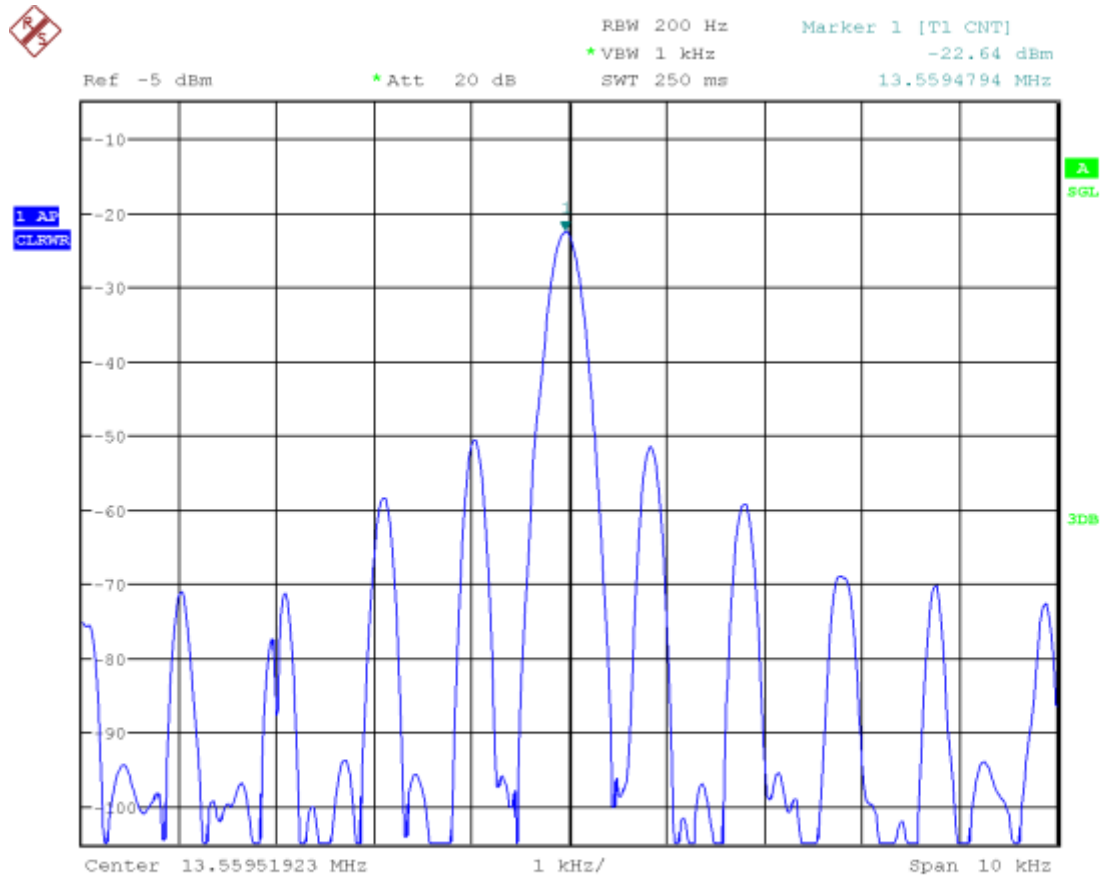
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T0_V12_4



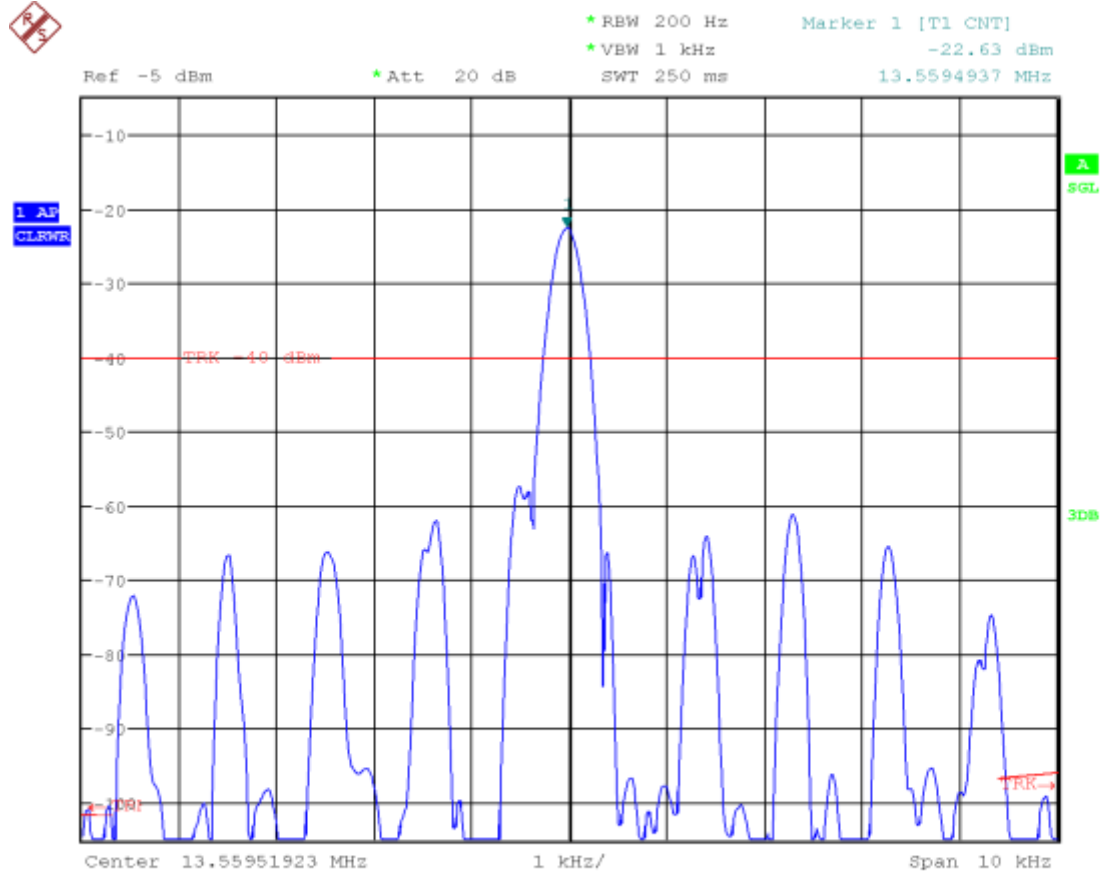
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T20_ref



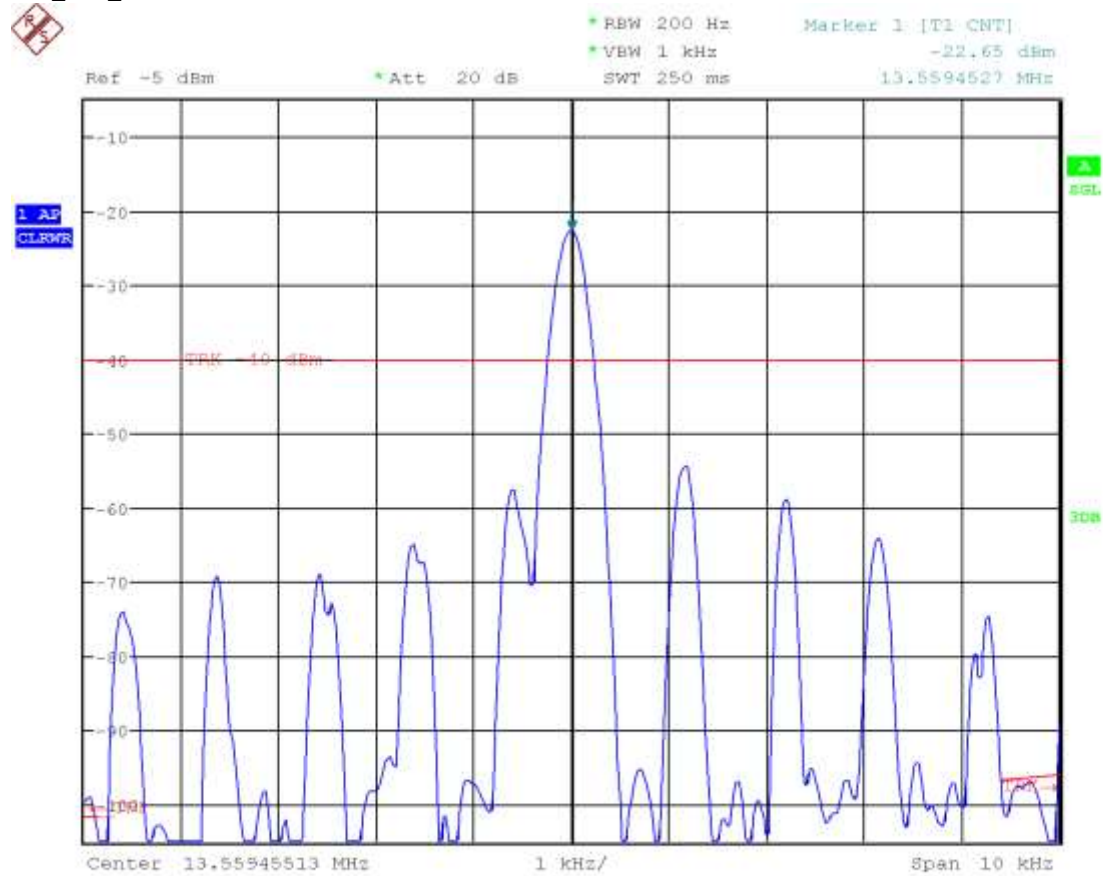
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T30_V12_1



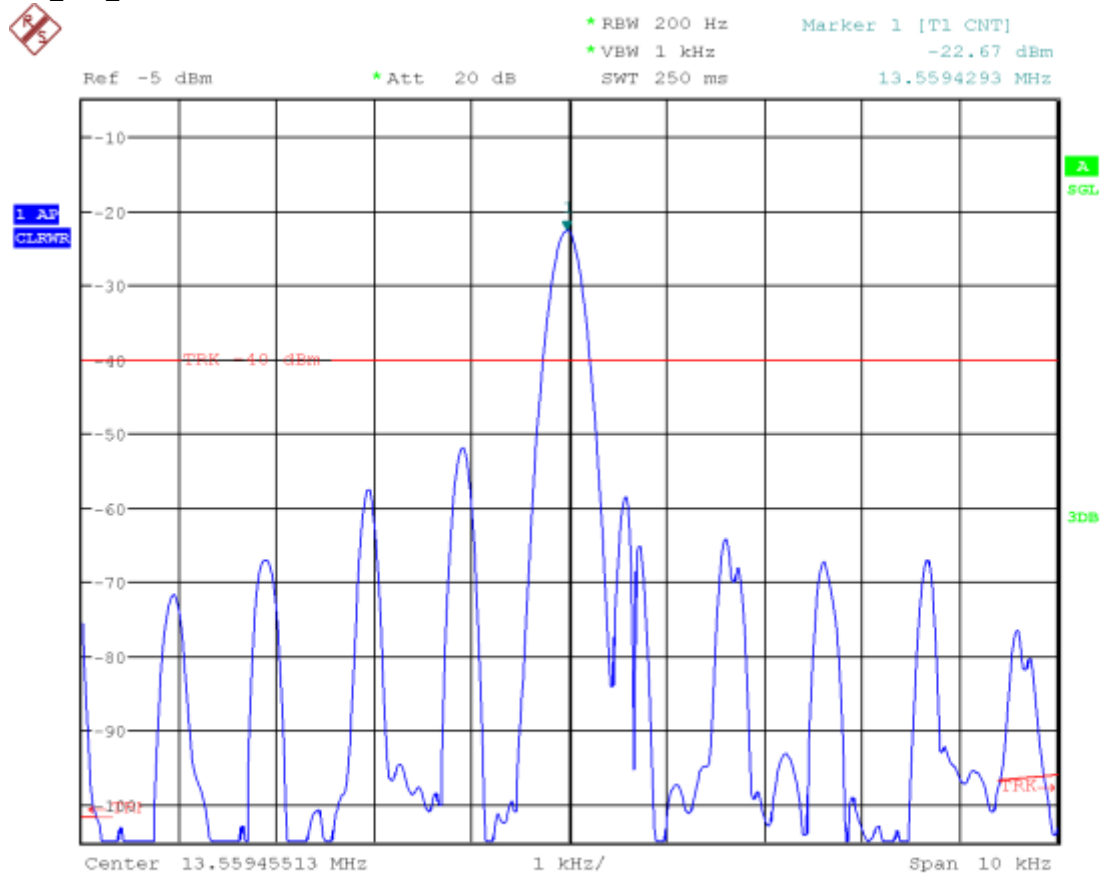
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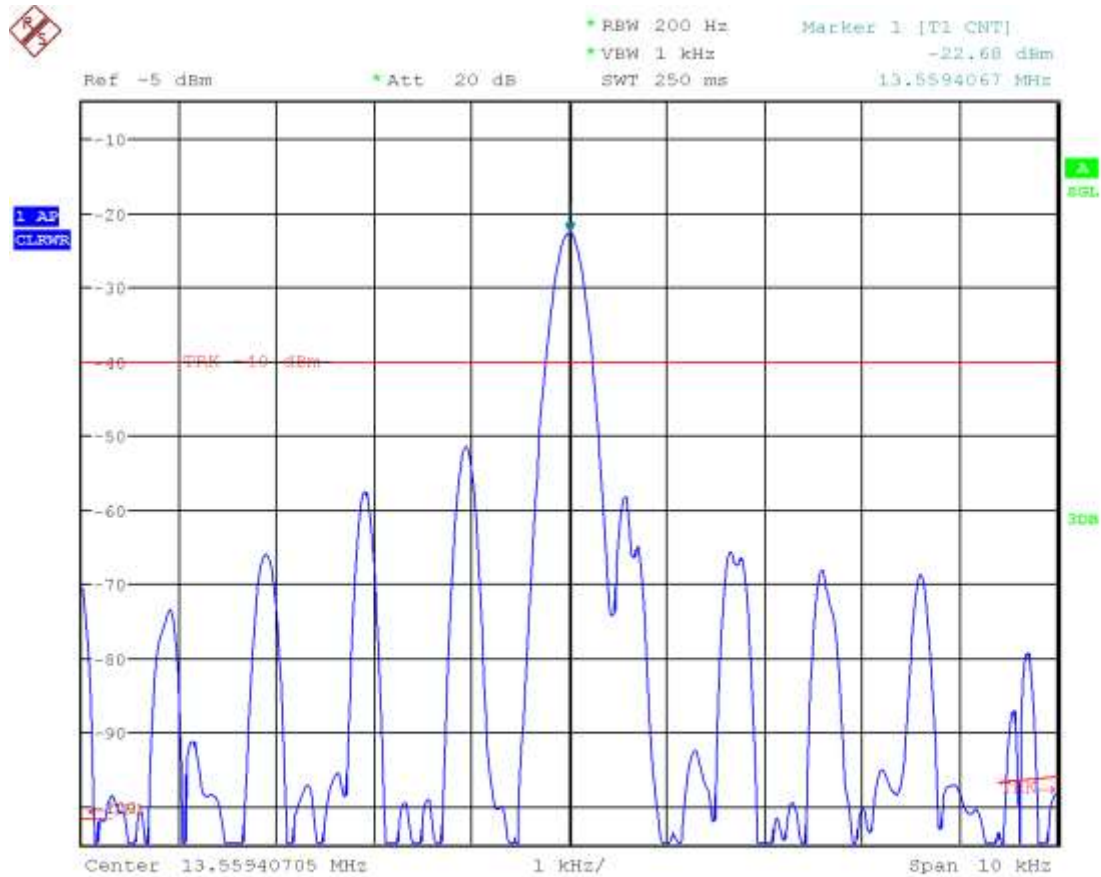
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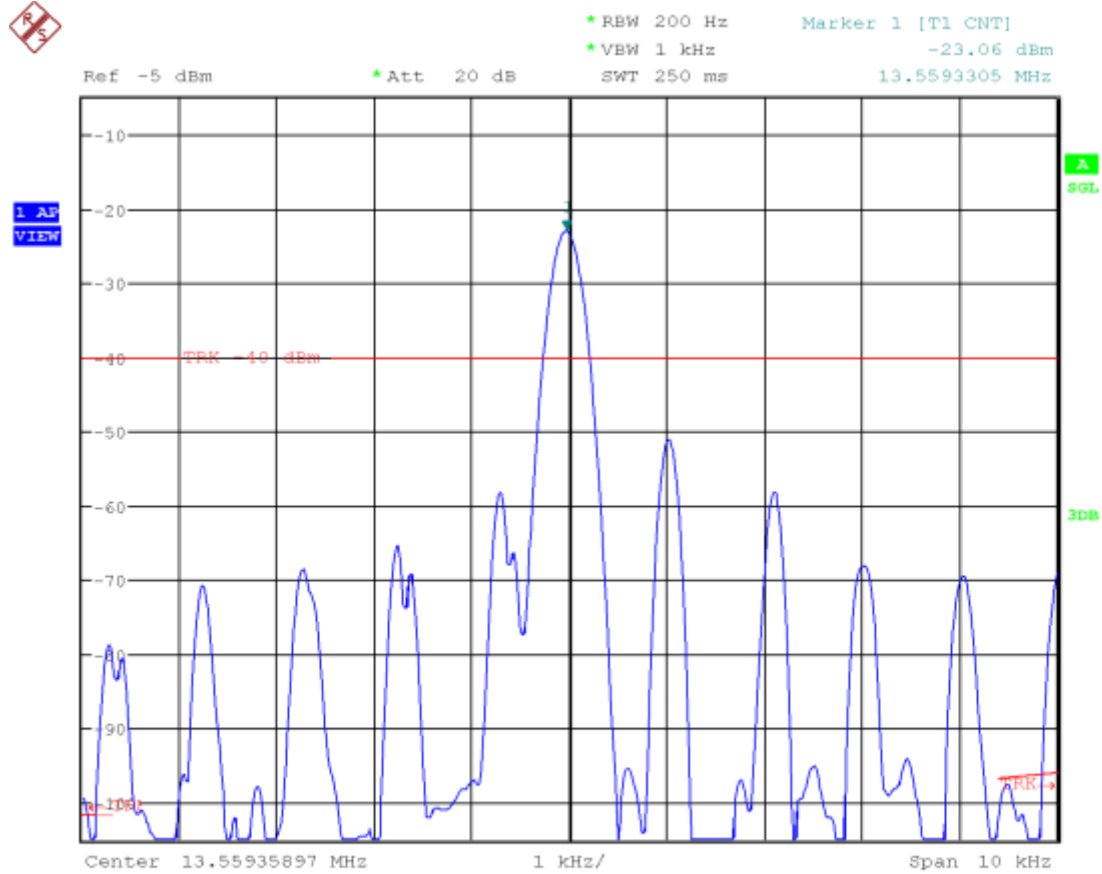
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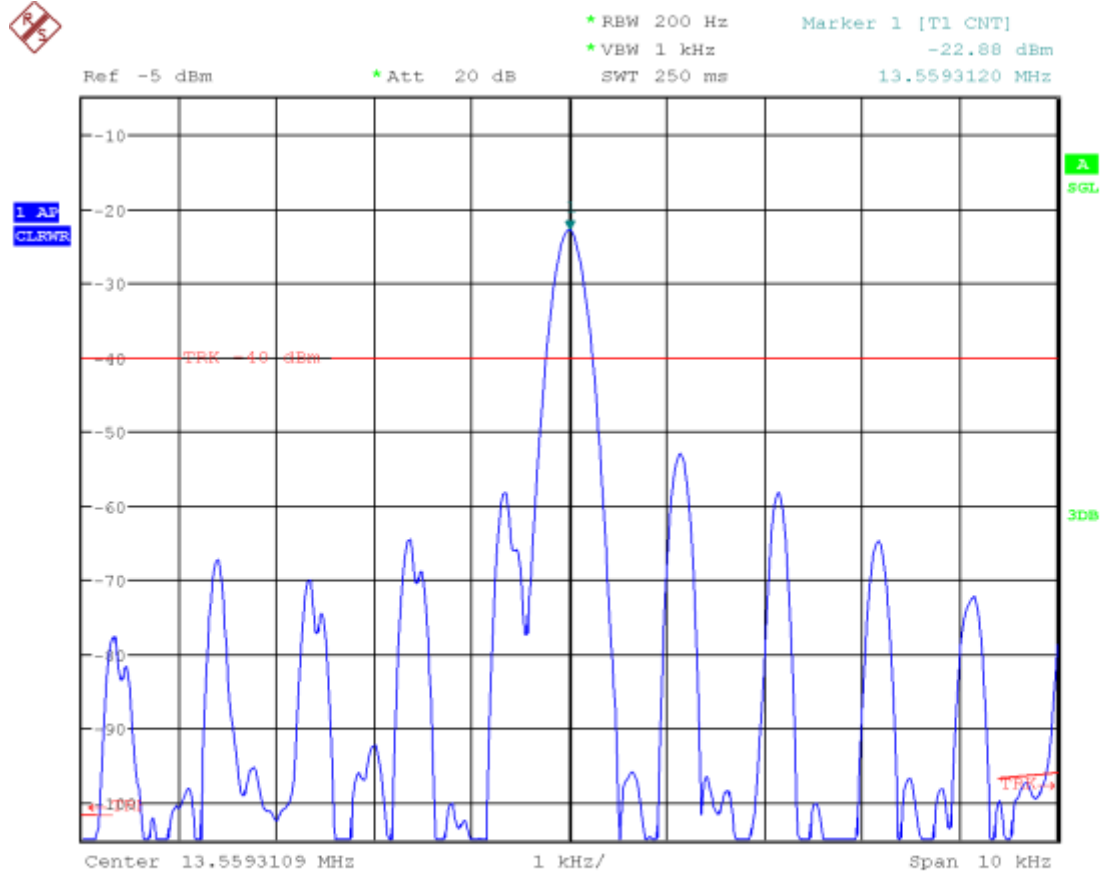
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T40_V12_1



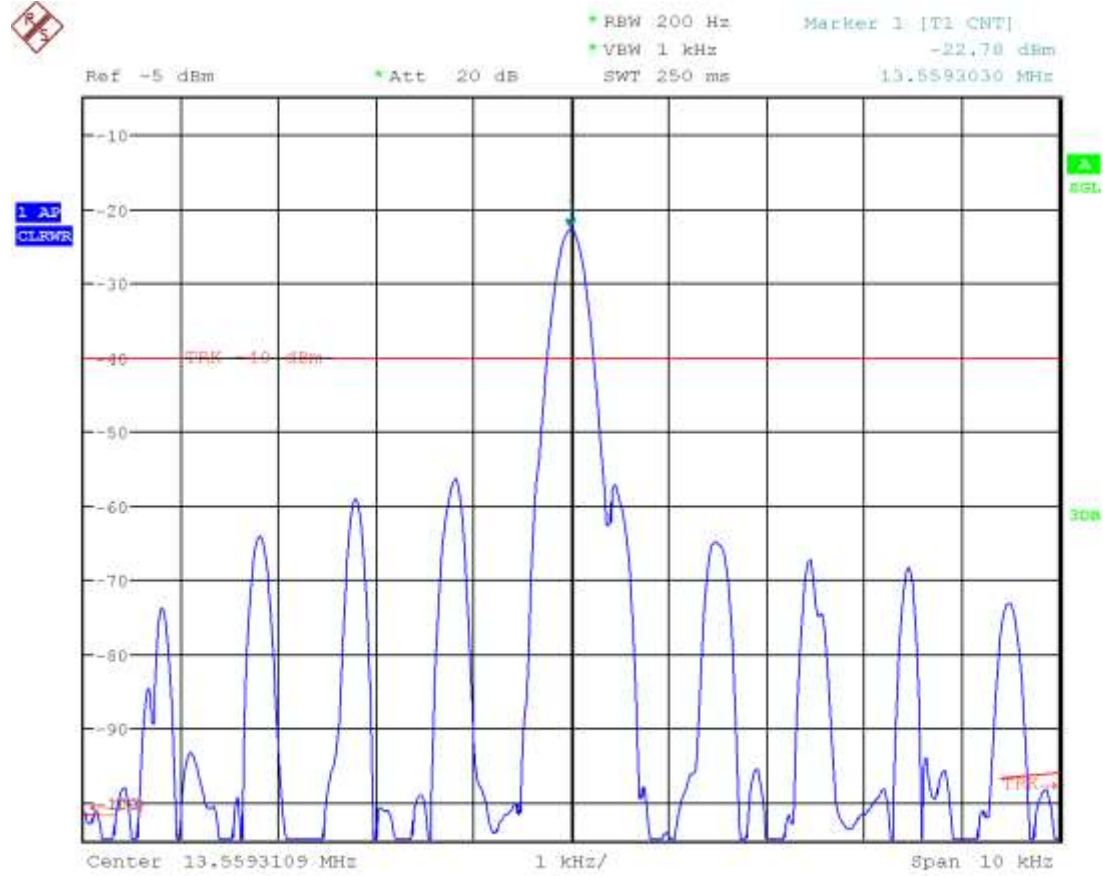
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T40_V12_2



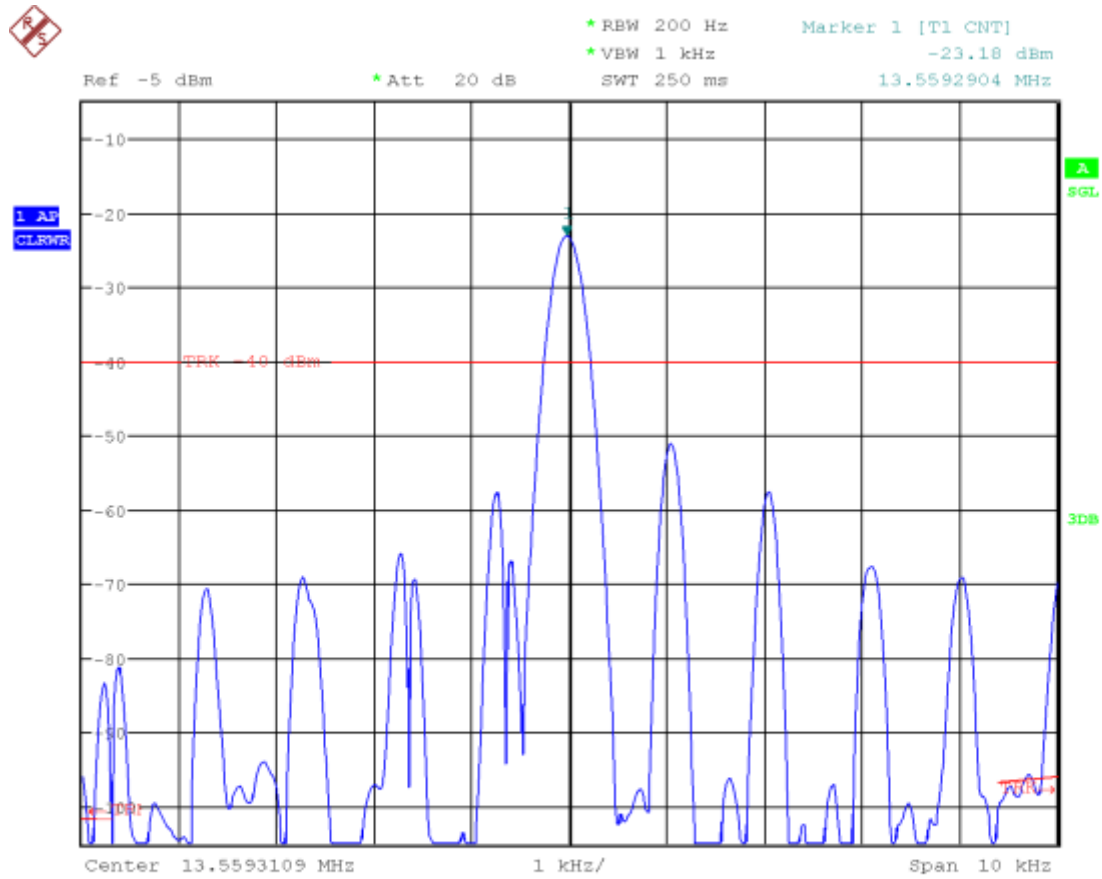
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T40_V12_3



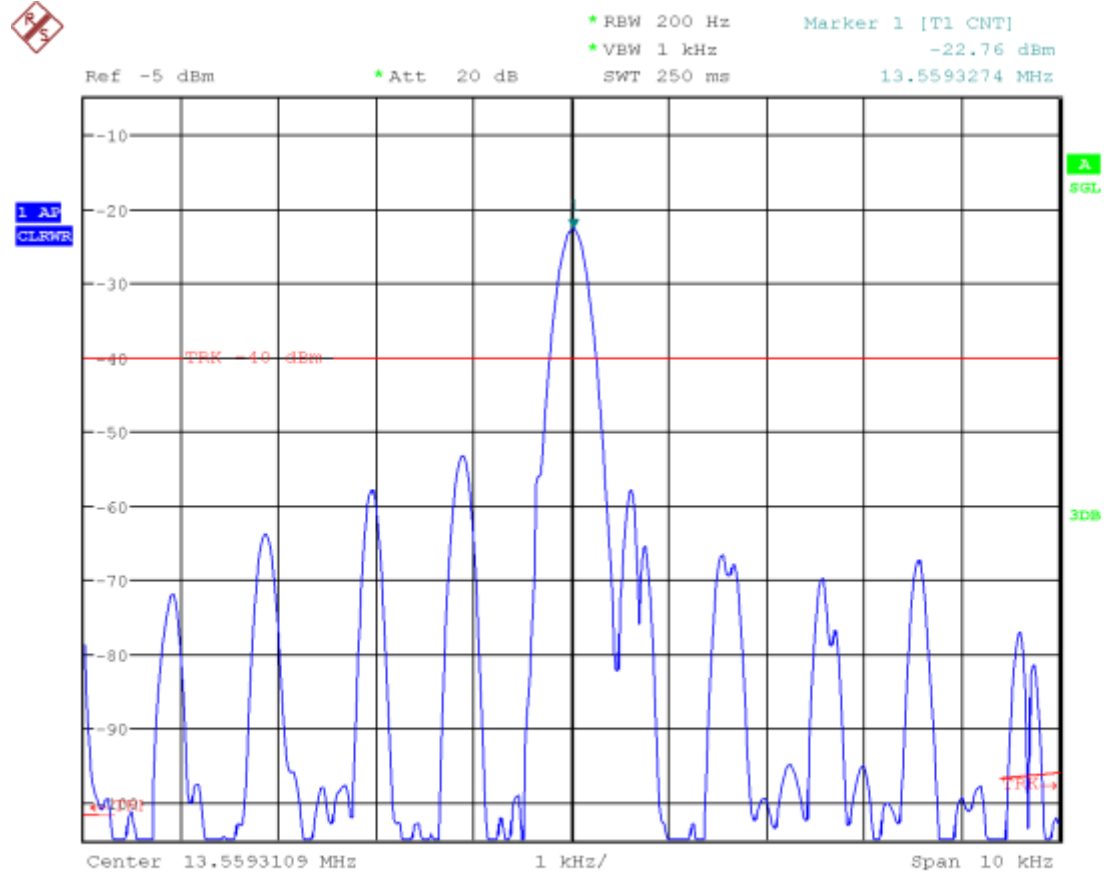
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T40_V12_4



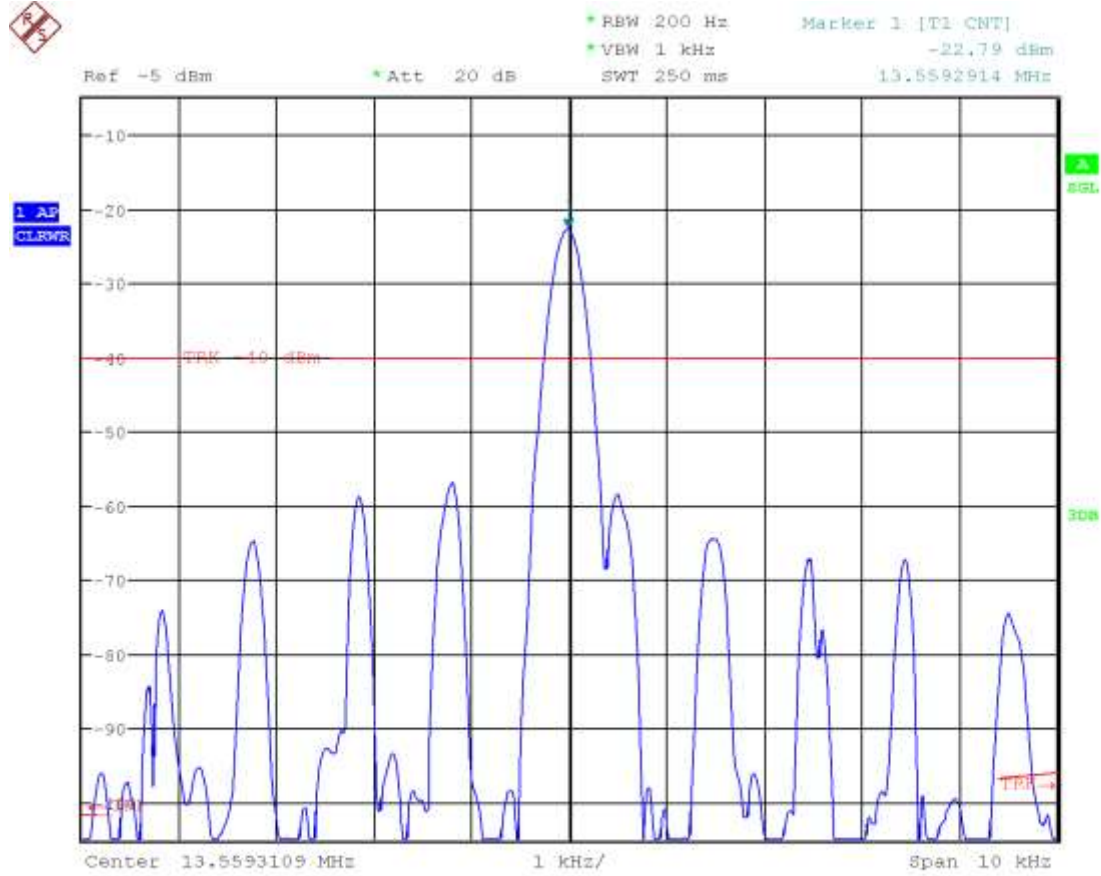
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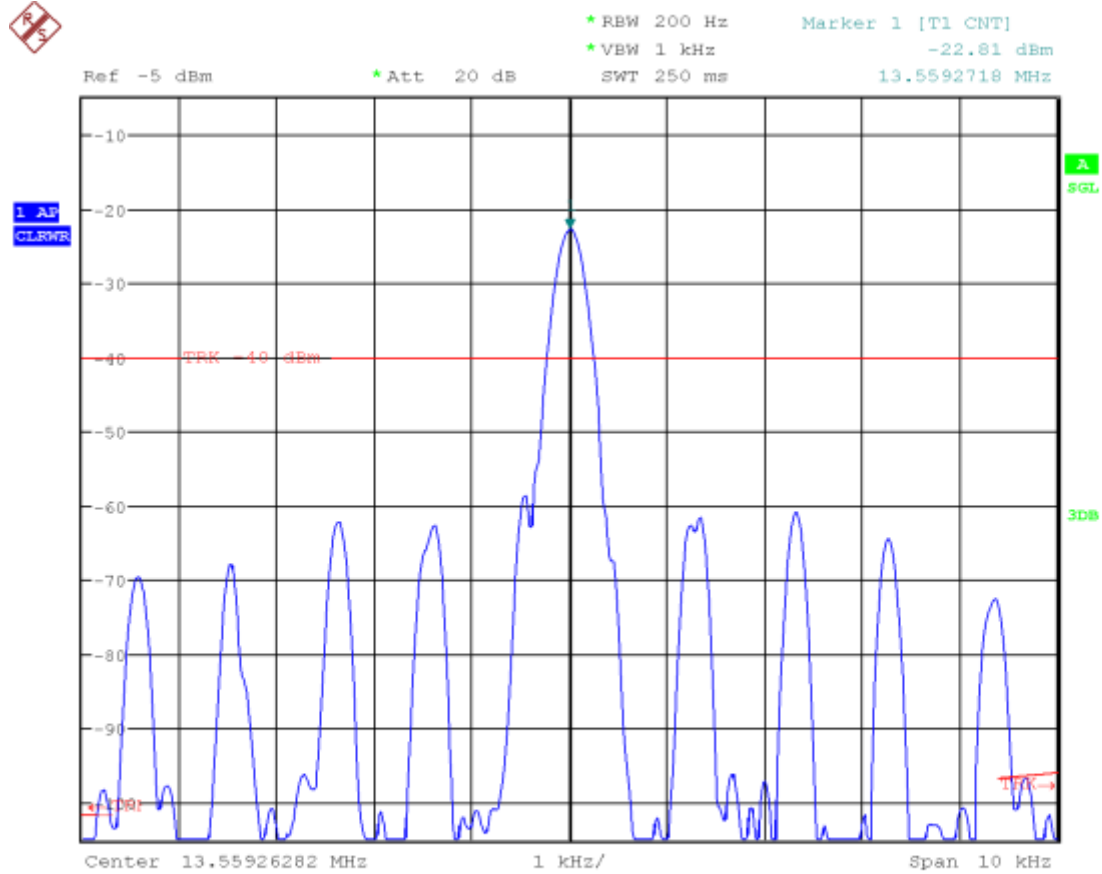
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T50_V12_2



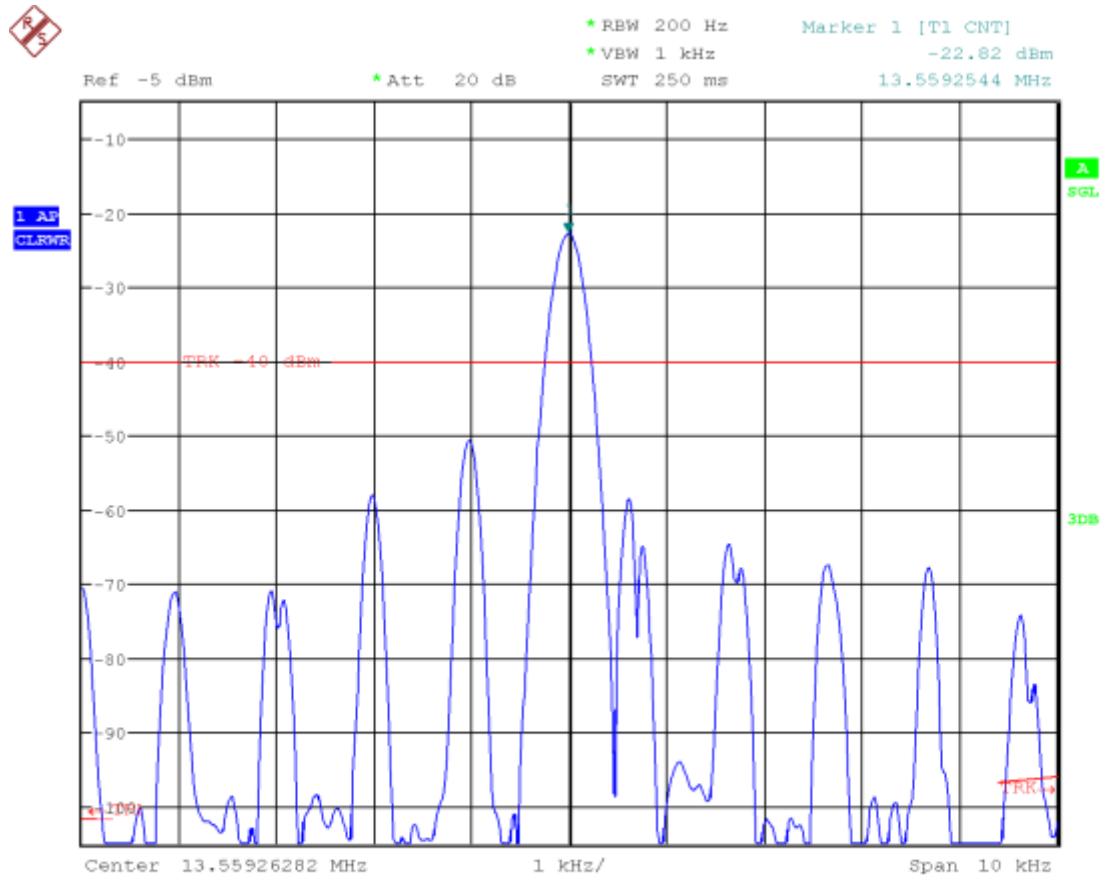
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T50_V12_3



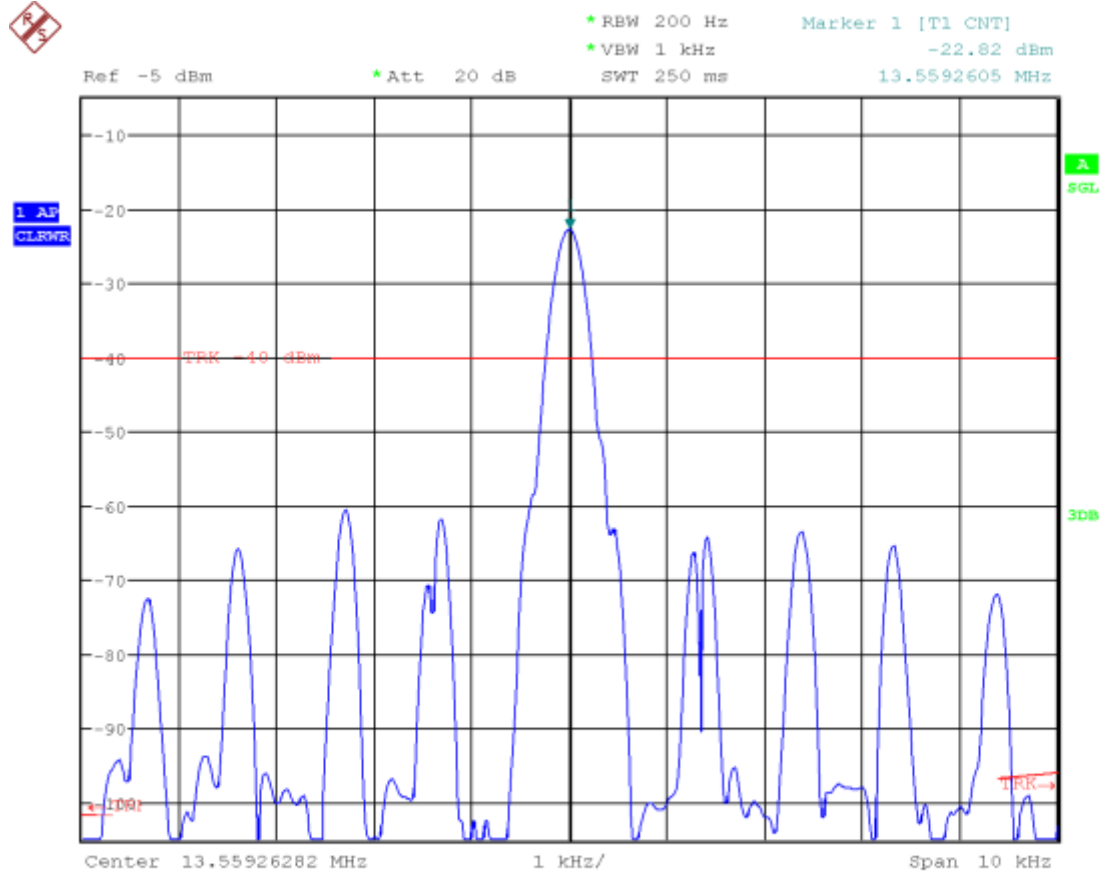
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T50_V12_4



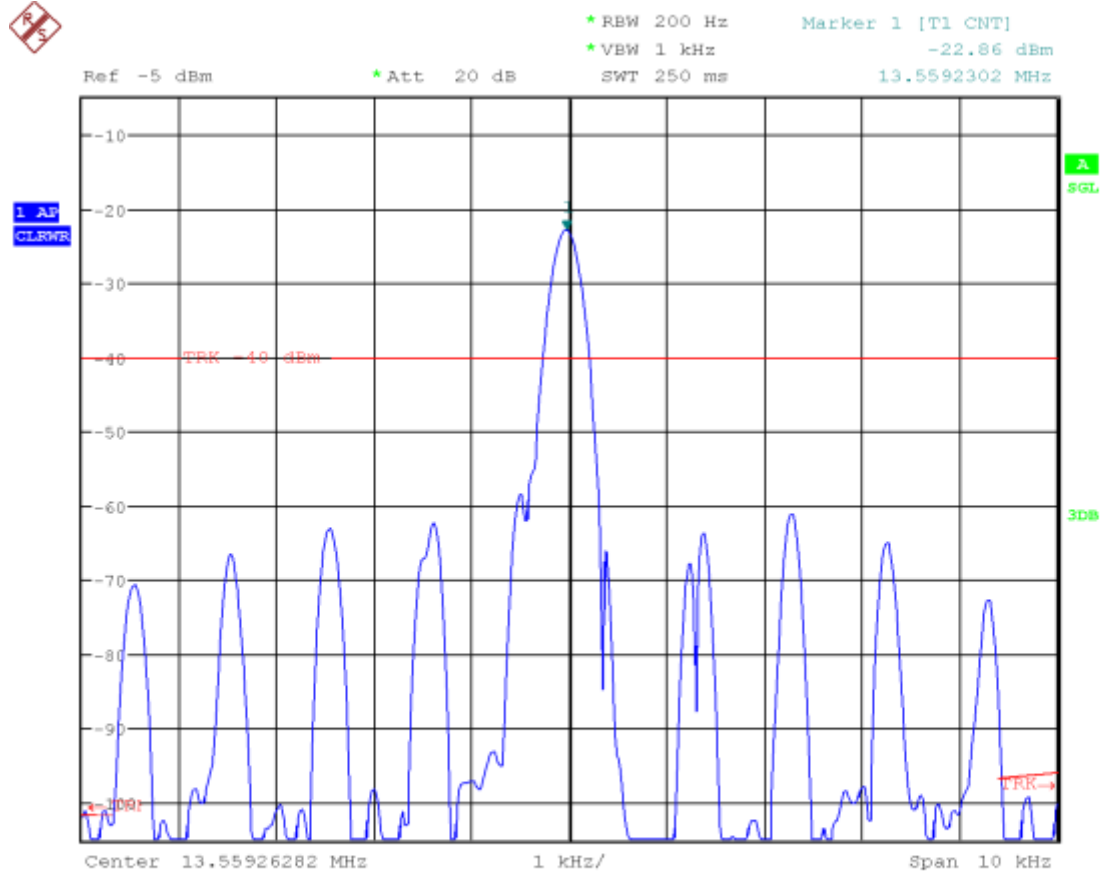
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T60_V12_1



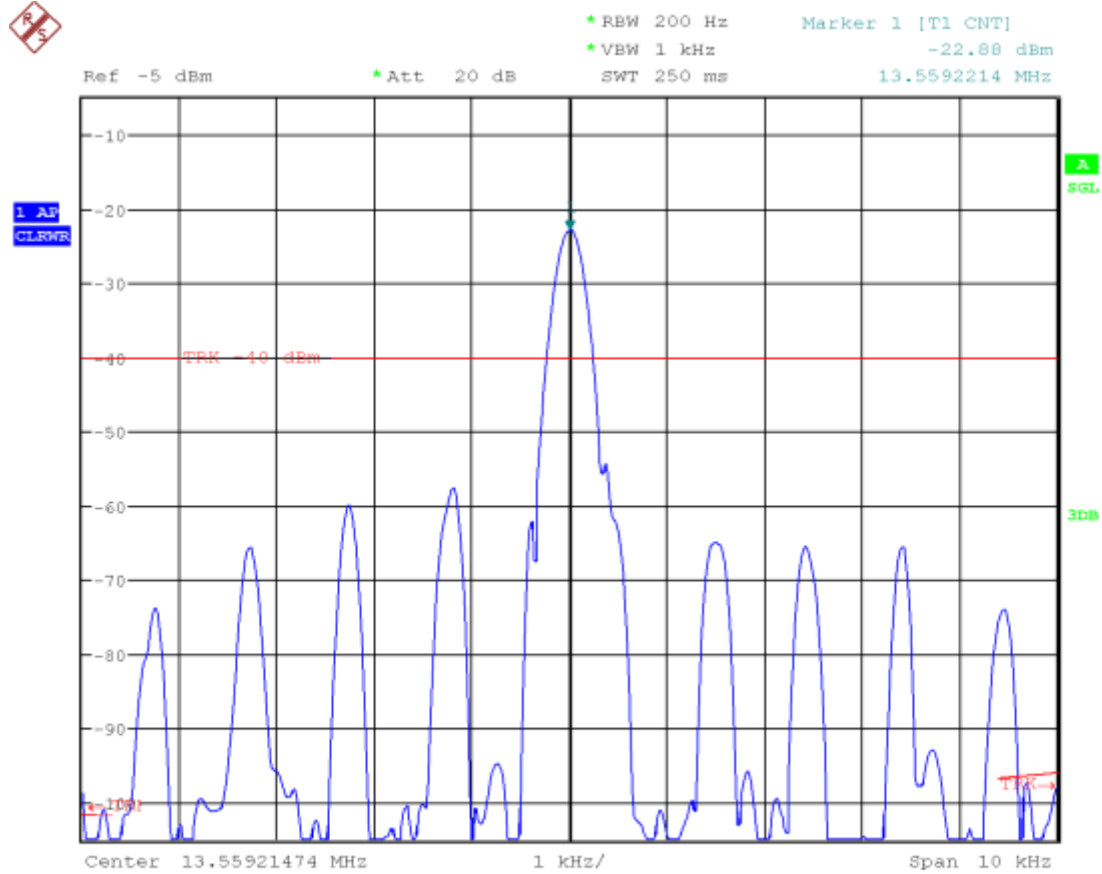
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T60_V12_2



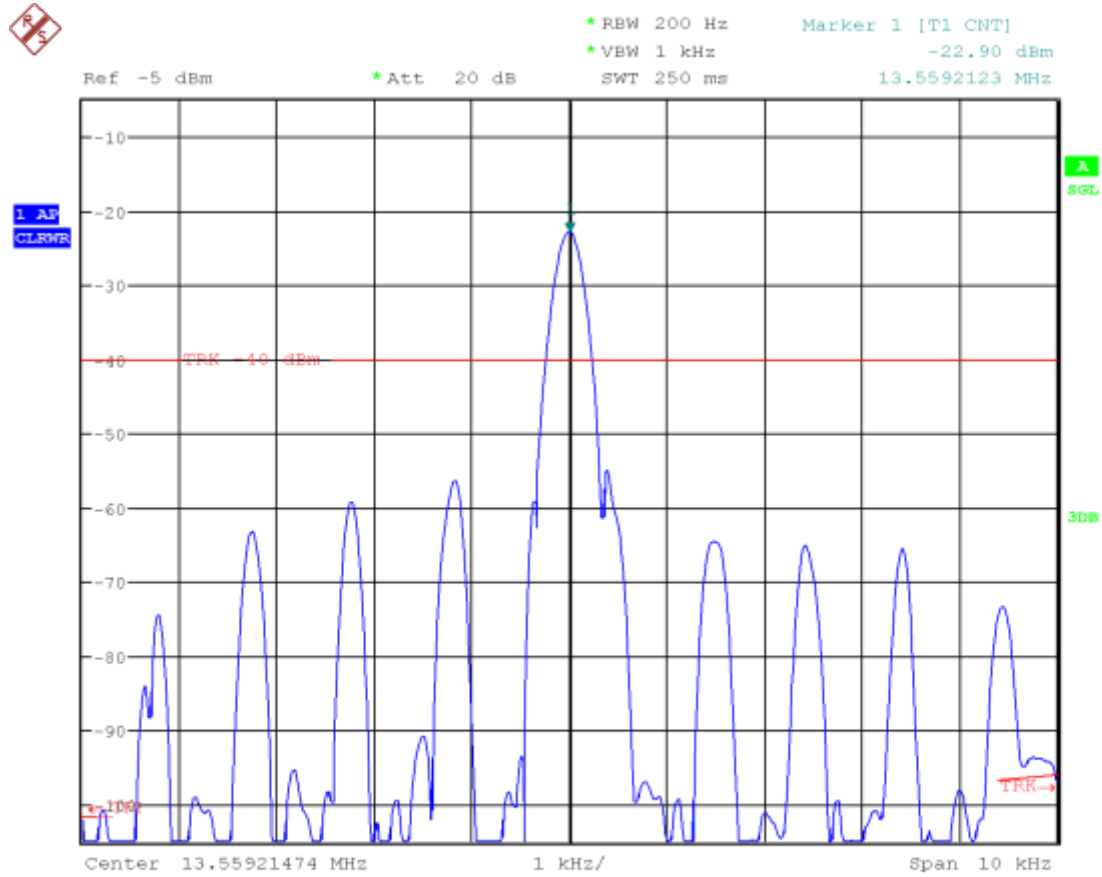
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T60_V12_3



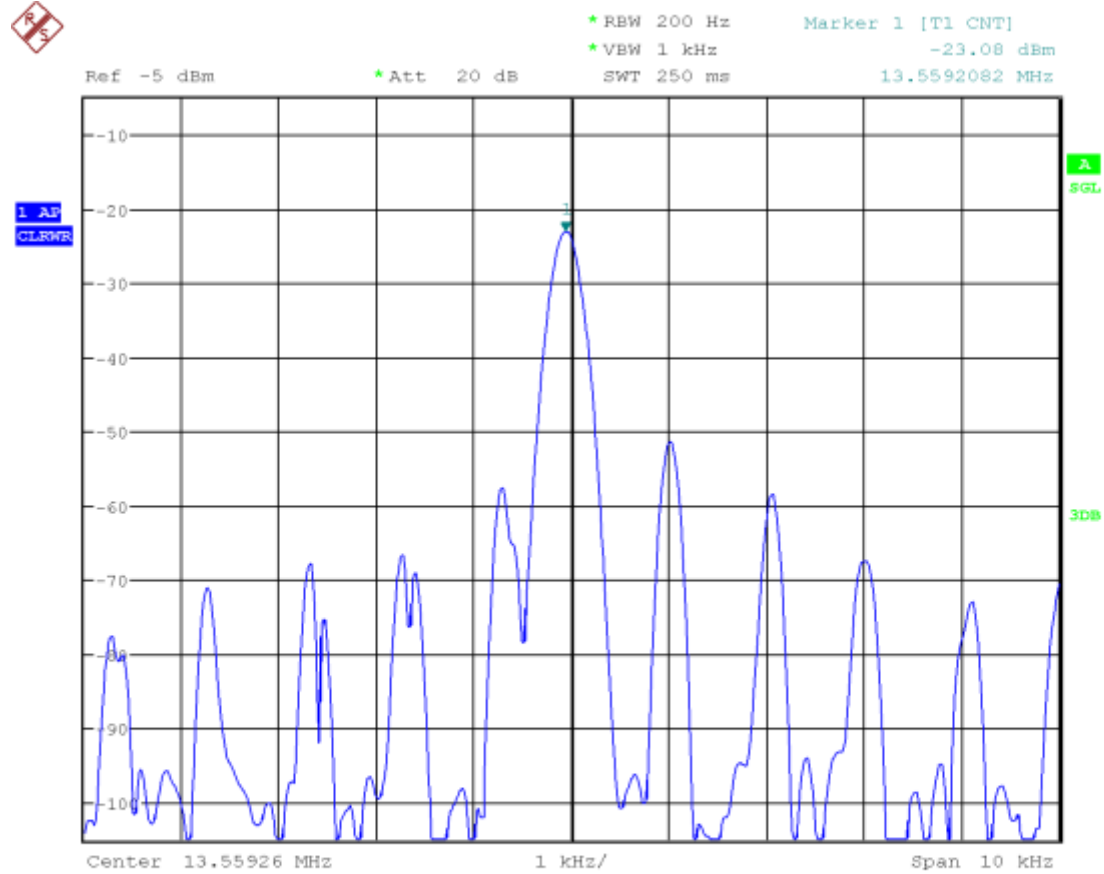
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T60_V12_4



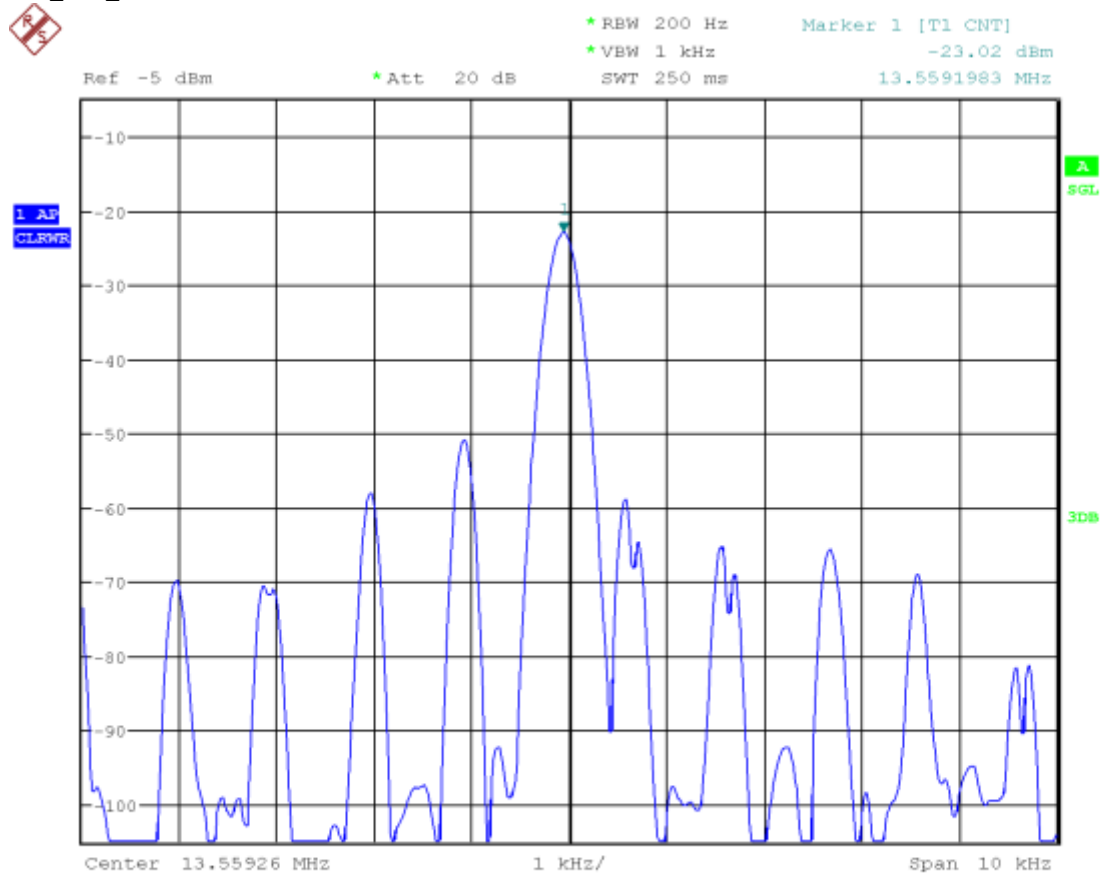
Date: 28.SEP.2022 15:51:16

T70_V12_1



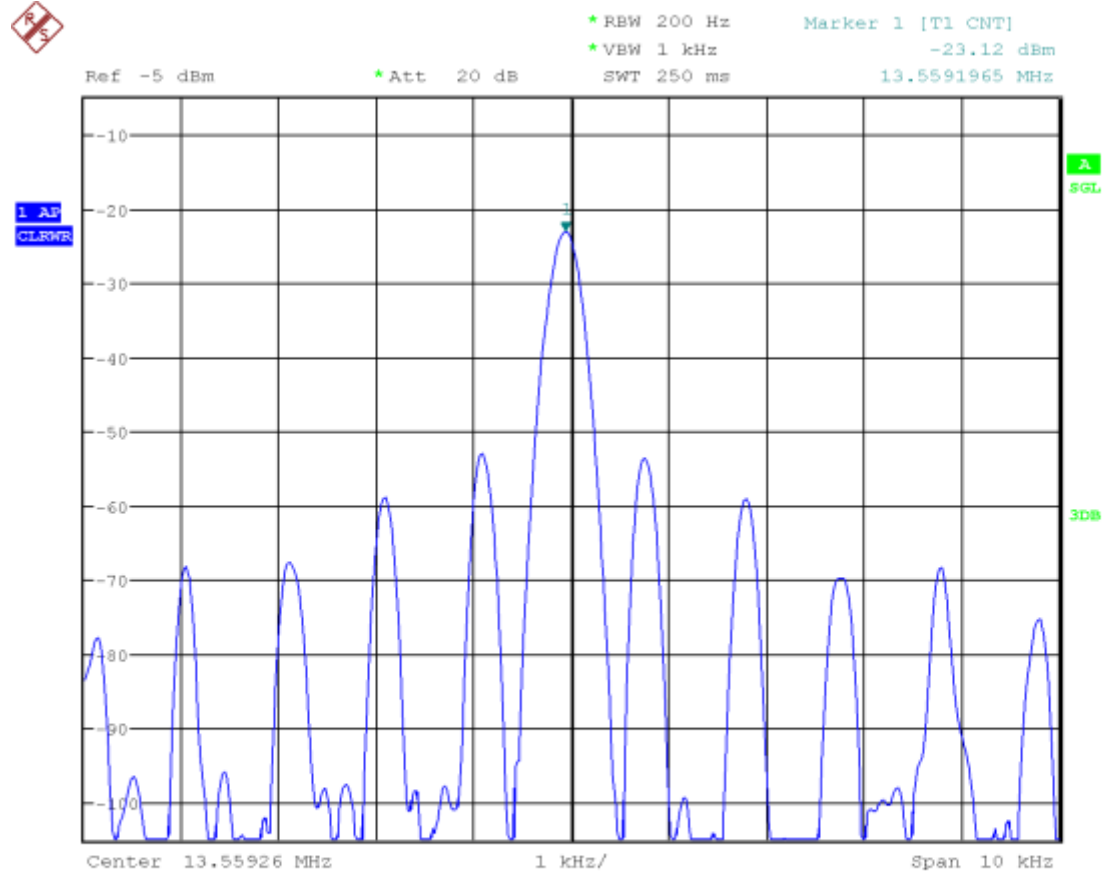
Date: 29.SEP.2022 08:12:36

T70_V12_2



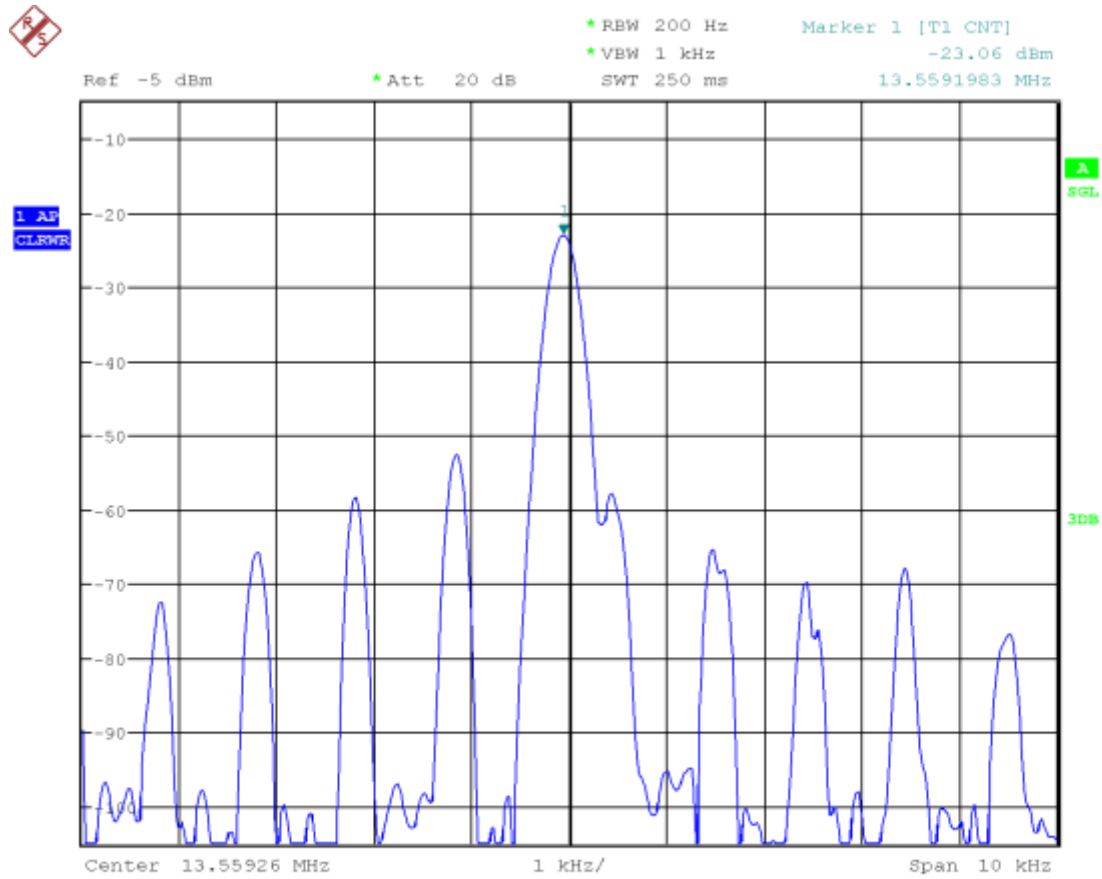
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T70_V12_3



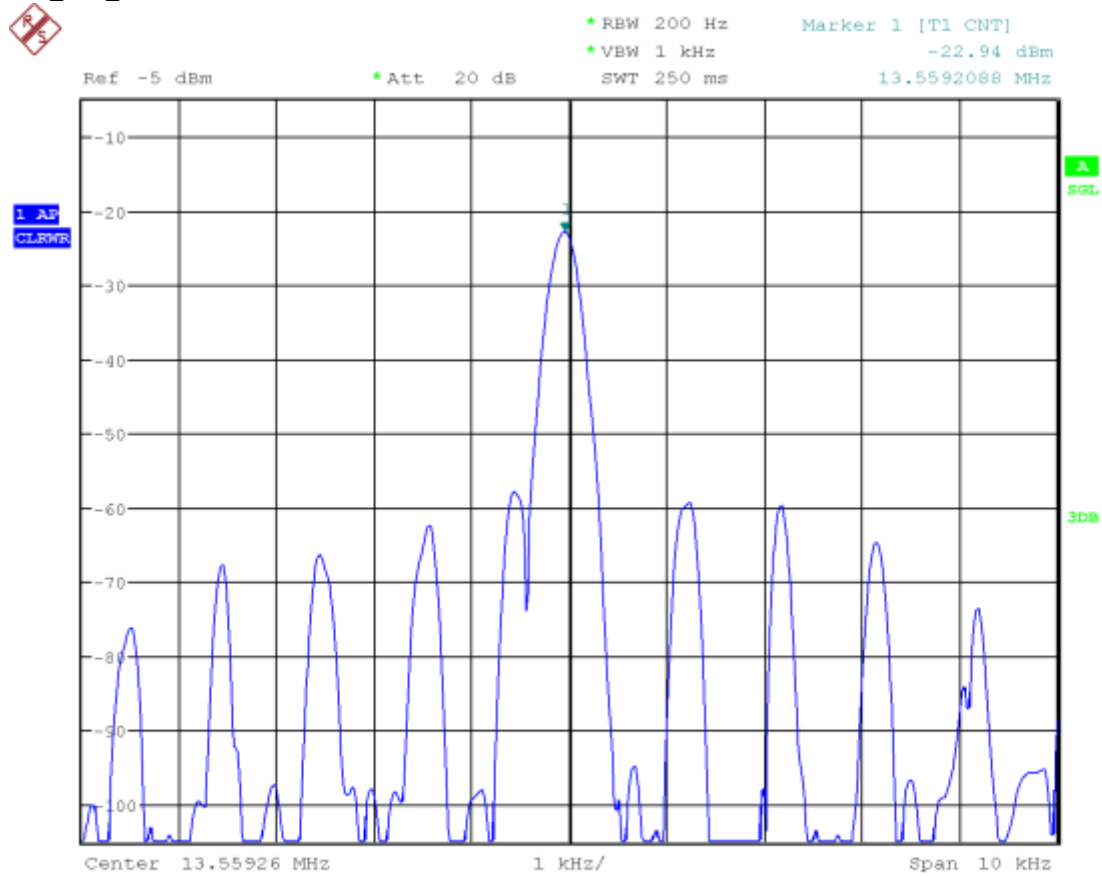
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T70_V12_4



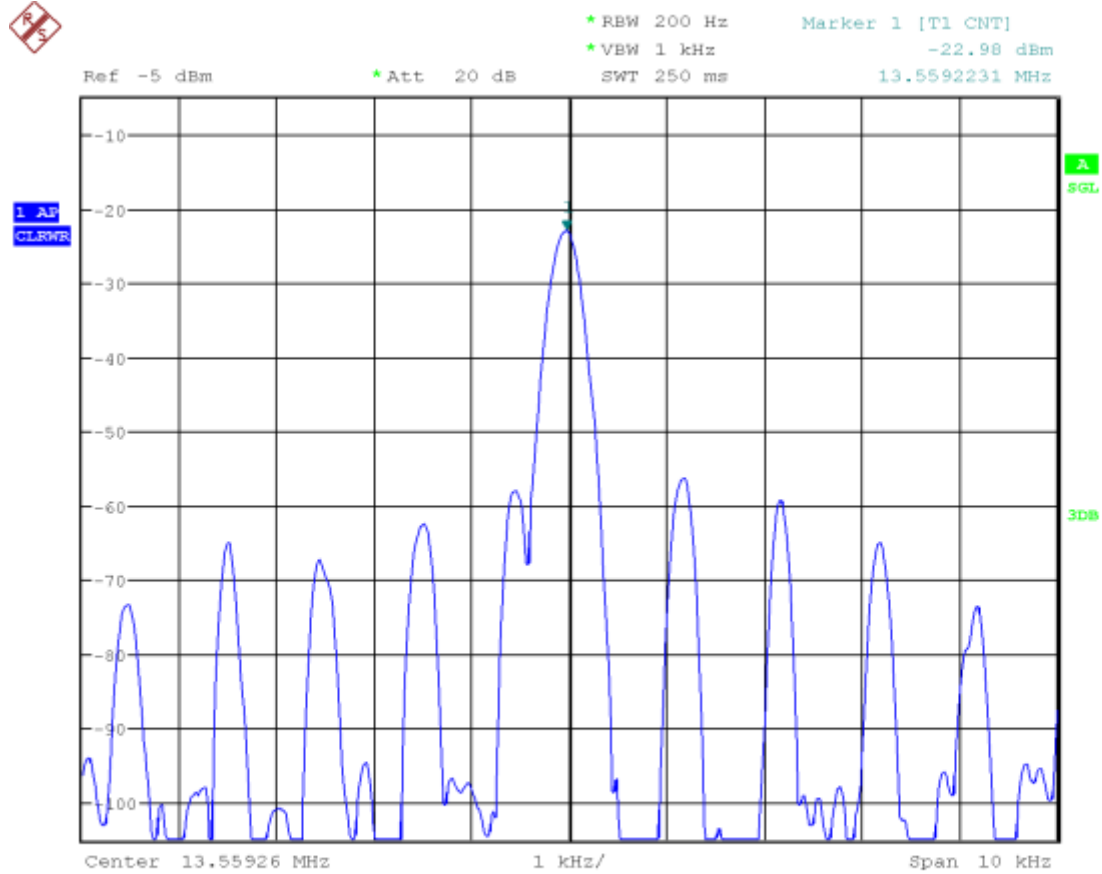
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T80_V12_1



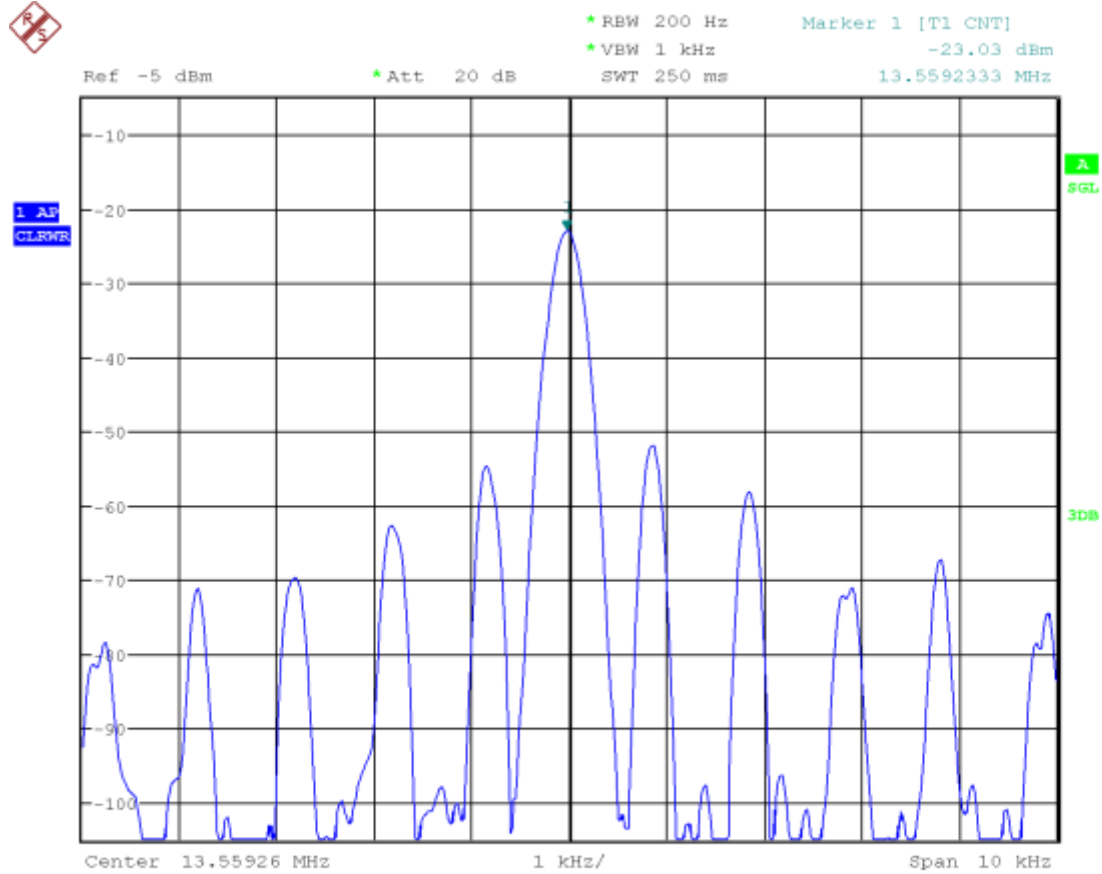
Date: 29.SEP.2022 09:19:23

T80_V12_2



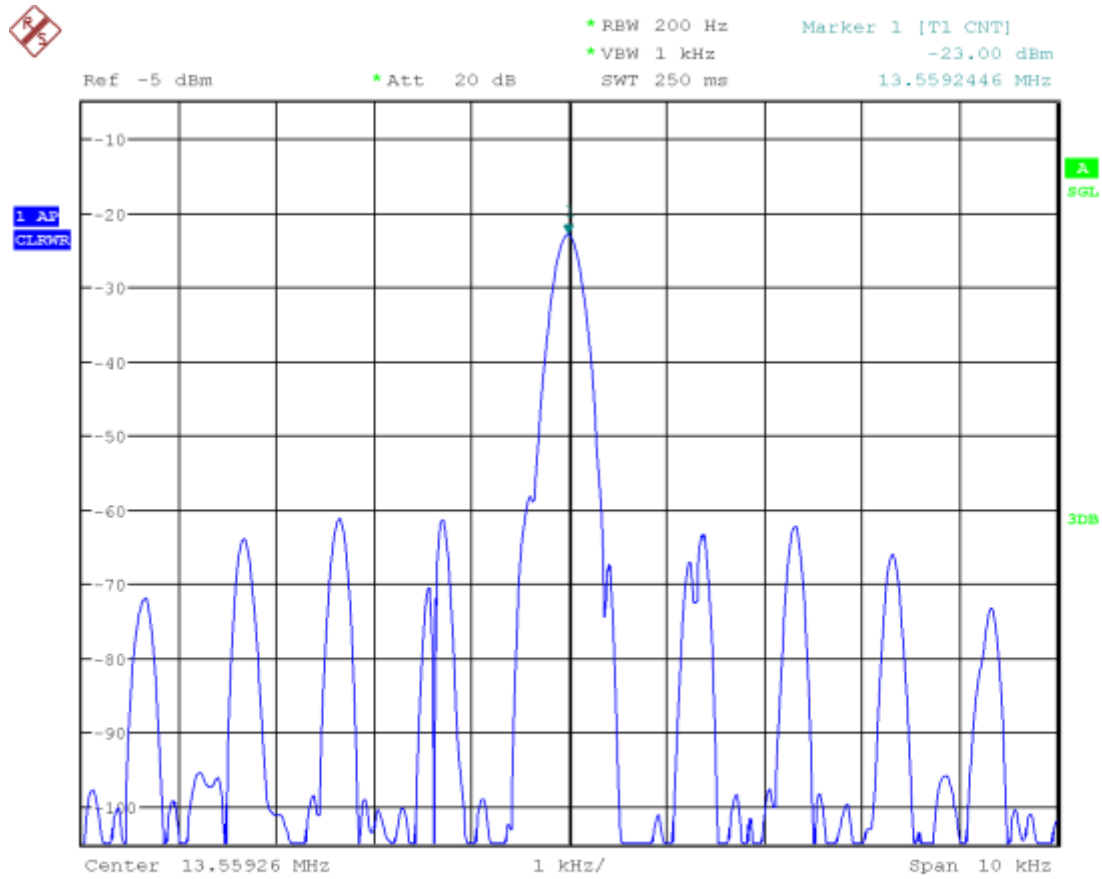
Date: 29.SEP.2022 09:21:34

T80_V12_3



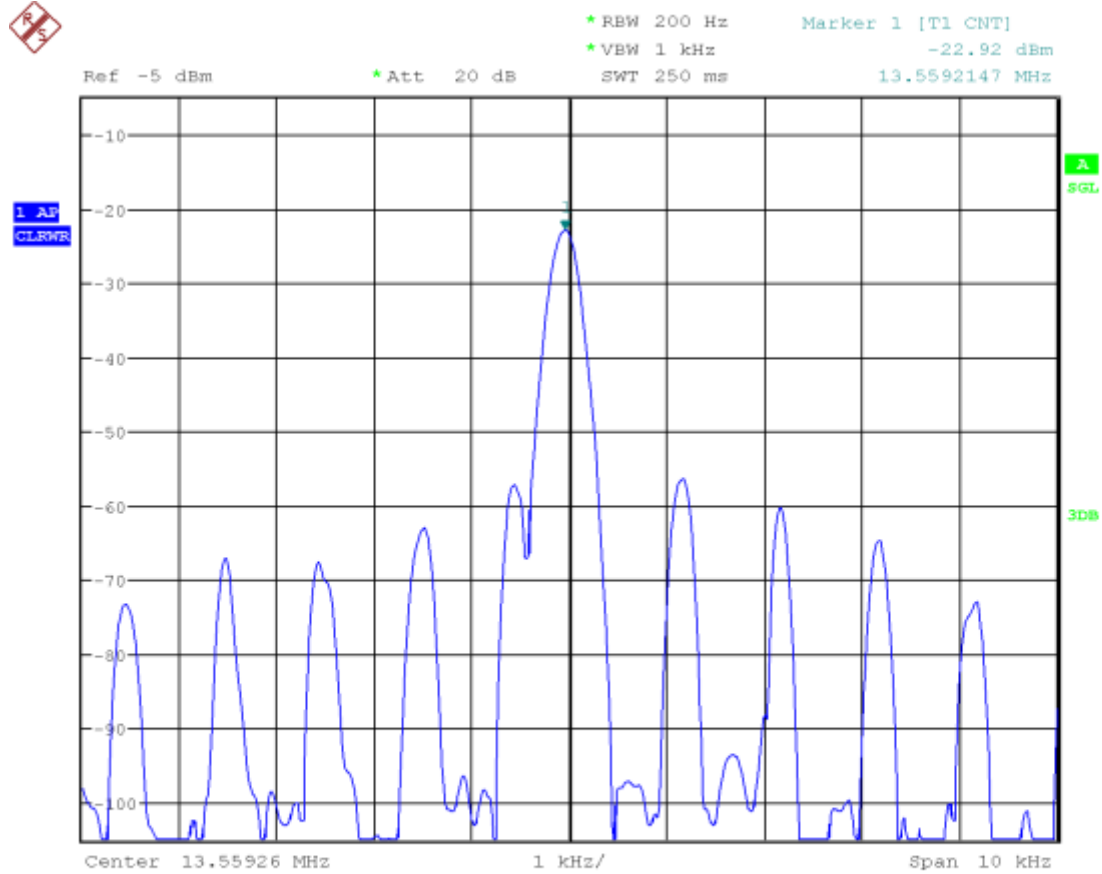
Date: 29.SEP.2022 09:24:31

T80_V12_4



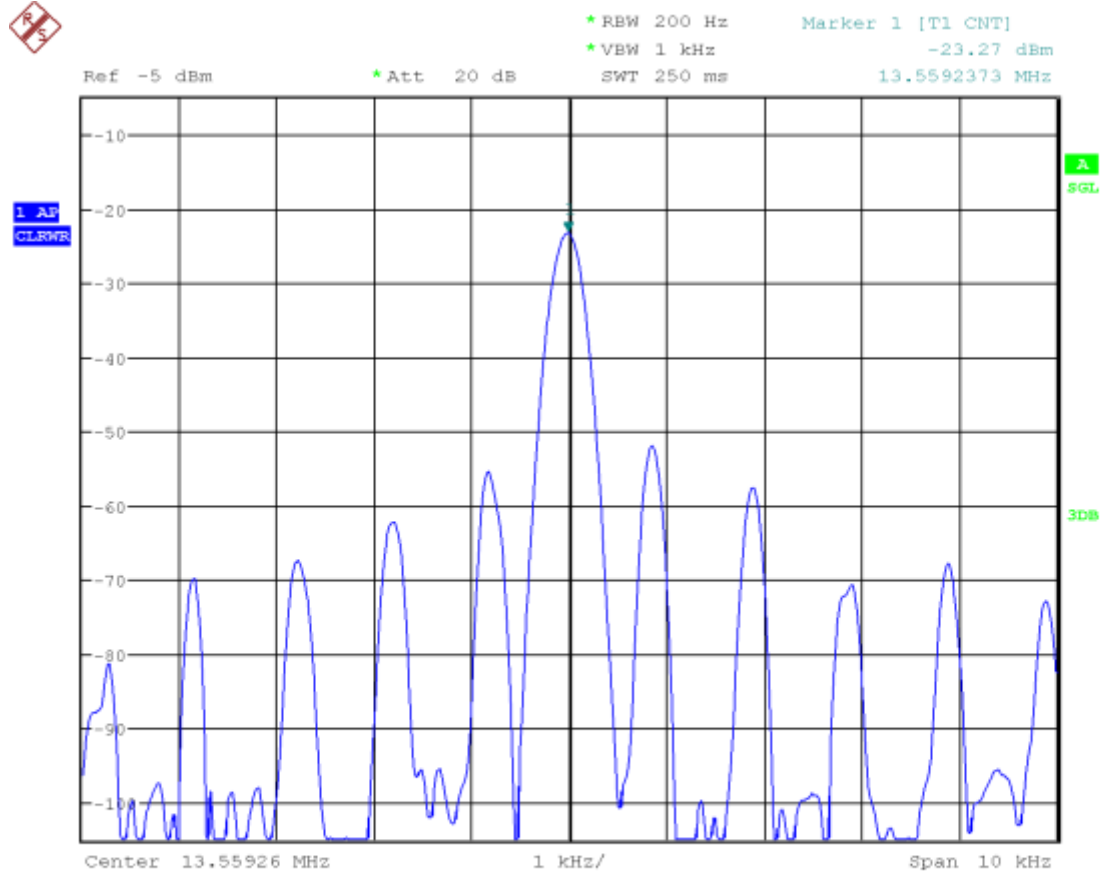
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T85_V12_1



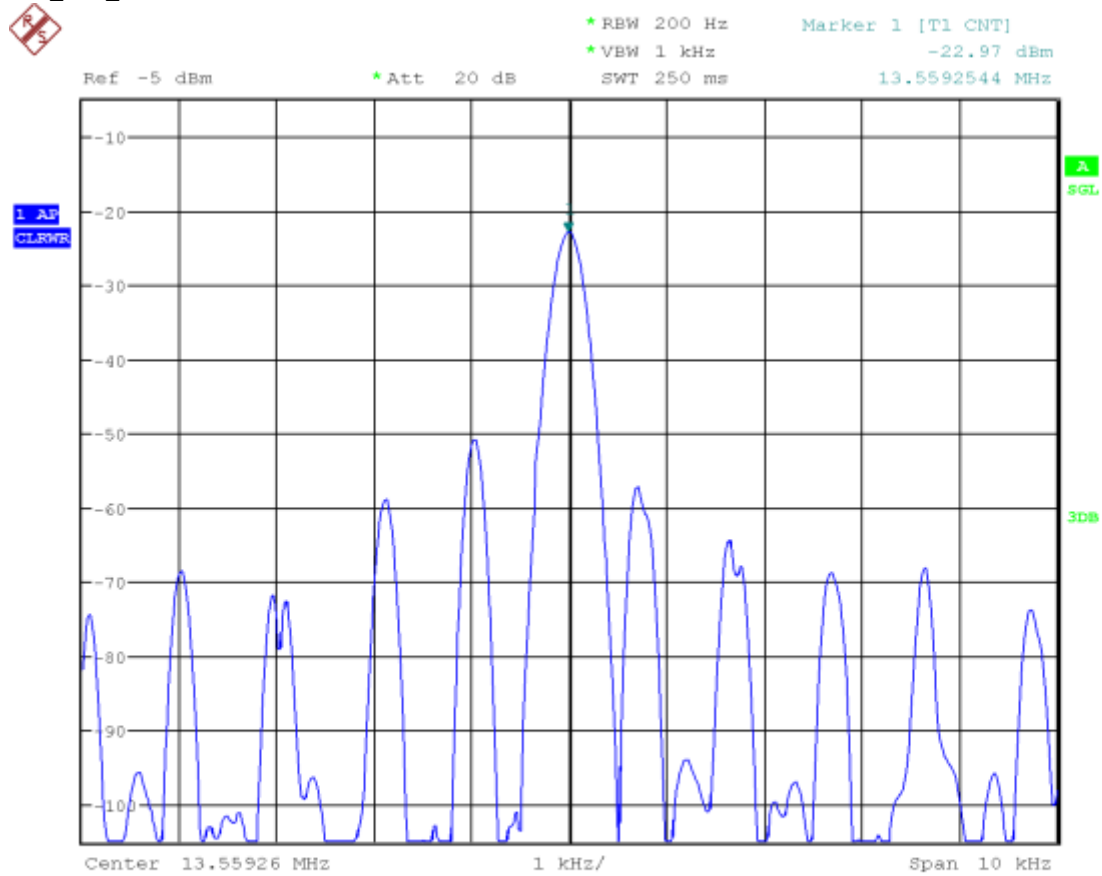
Date: 29.SEP.2022 09:58:57

T85_V12_2



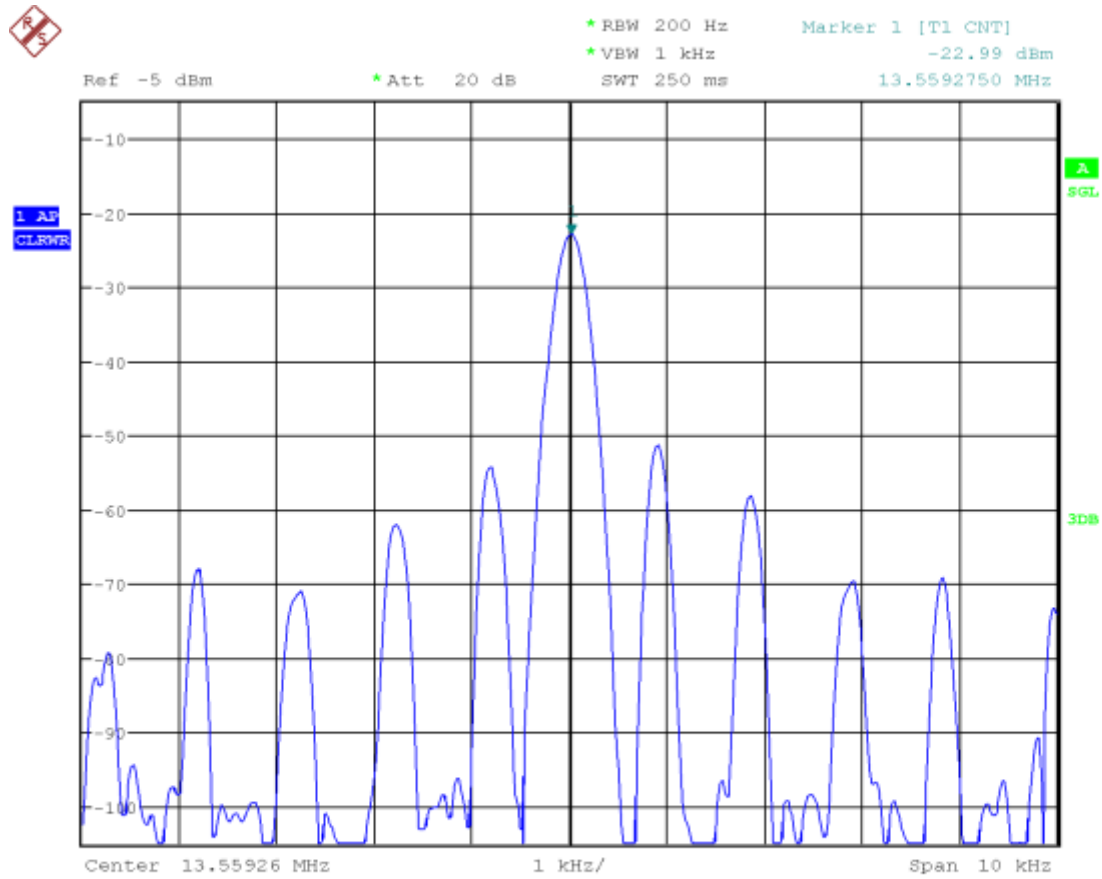
Date: 29.SEP.2022 10:01:02

T85_V12_3



Date: 29.SEP.2022 10:03:58

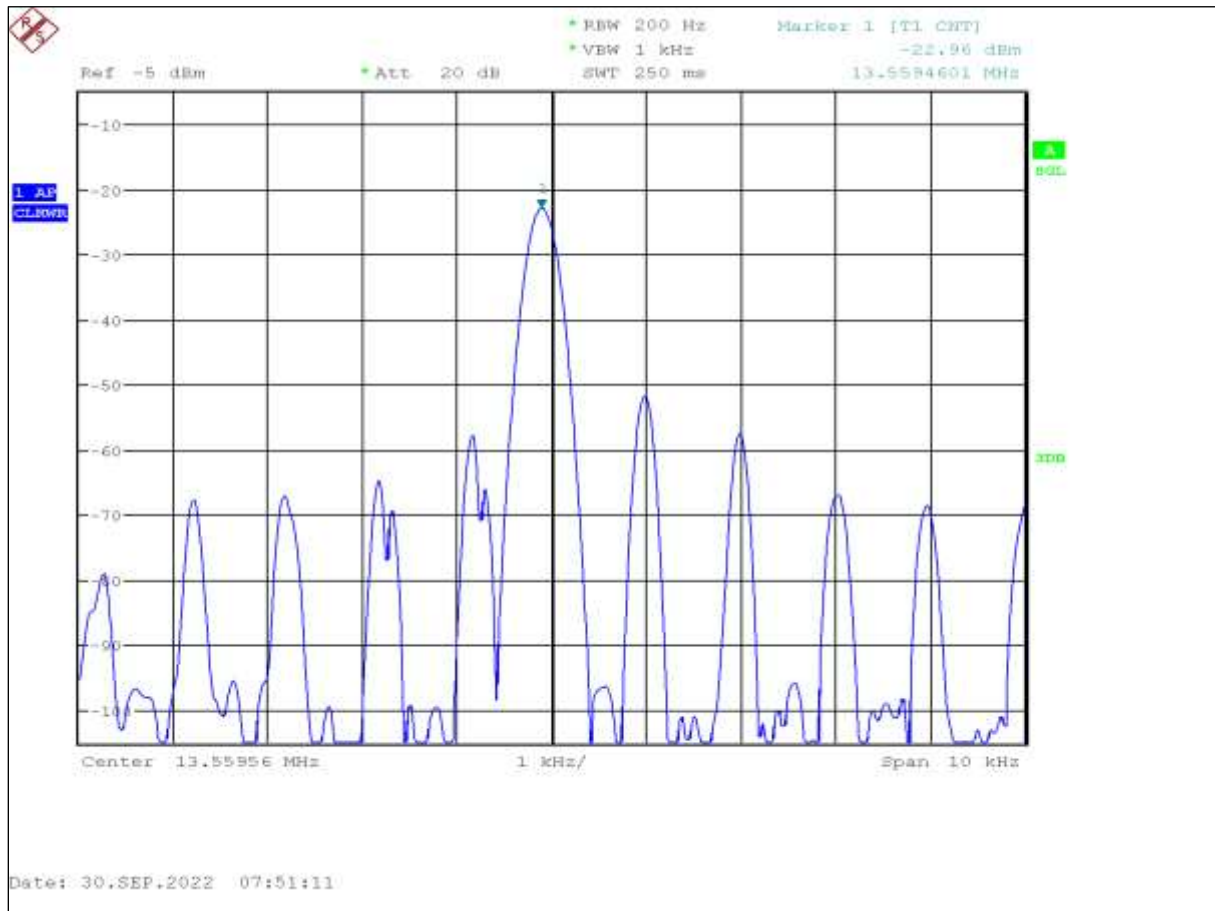
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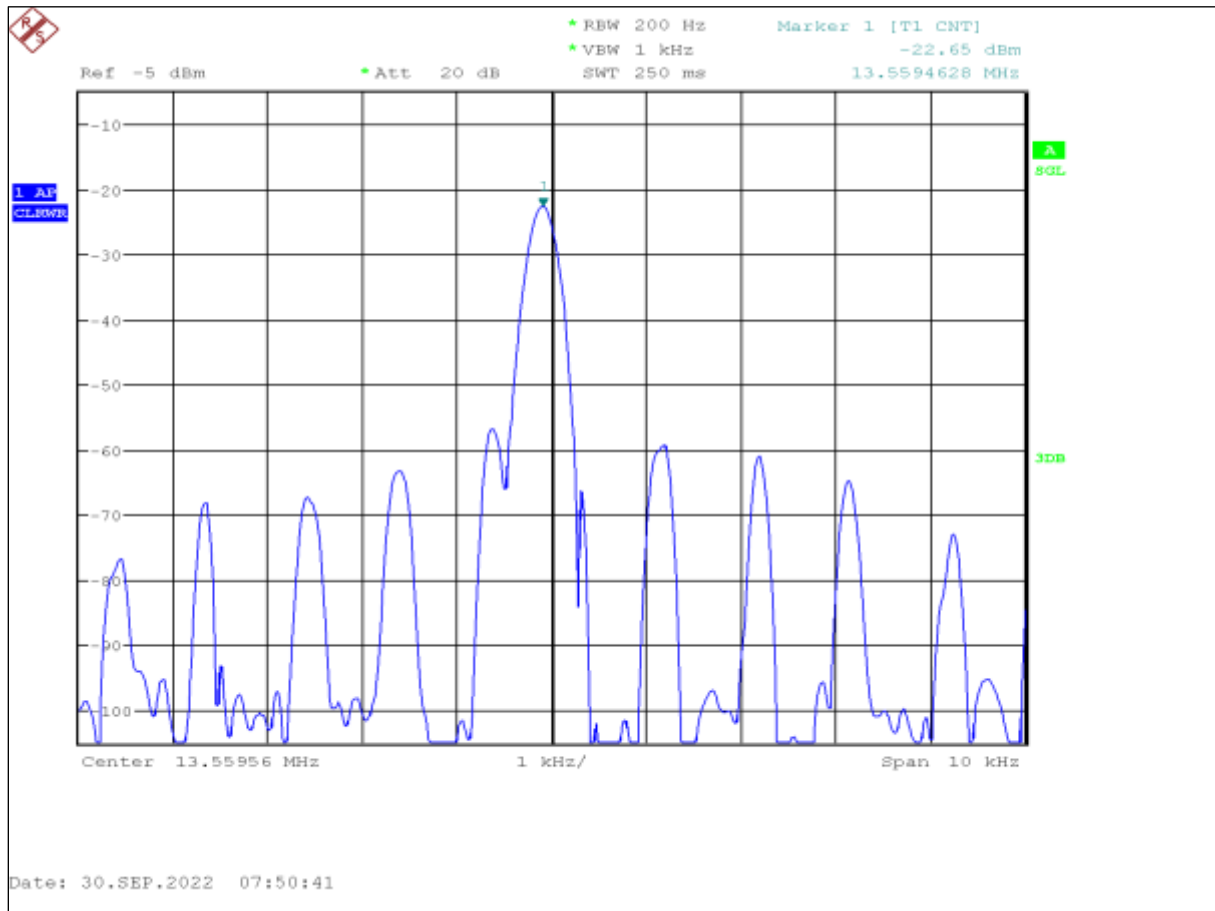
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1.5.2 Voltage variation

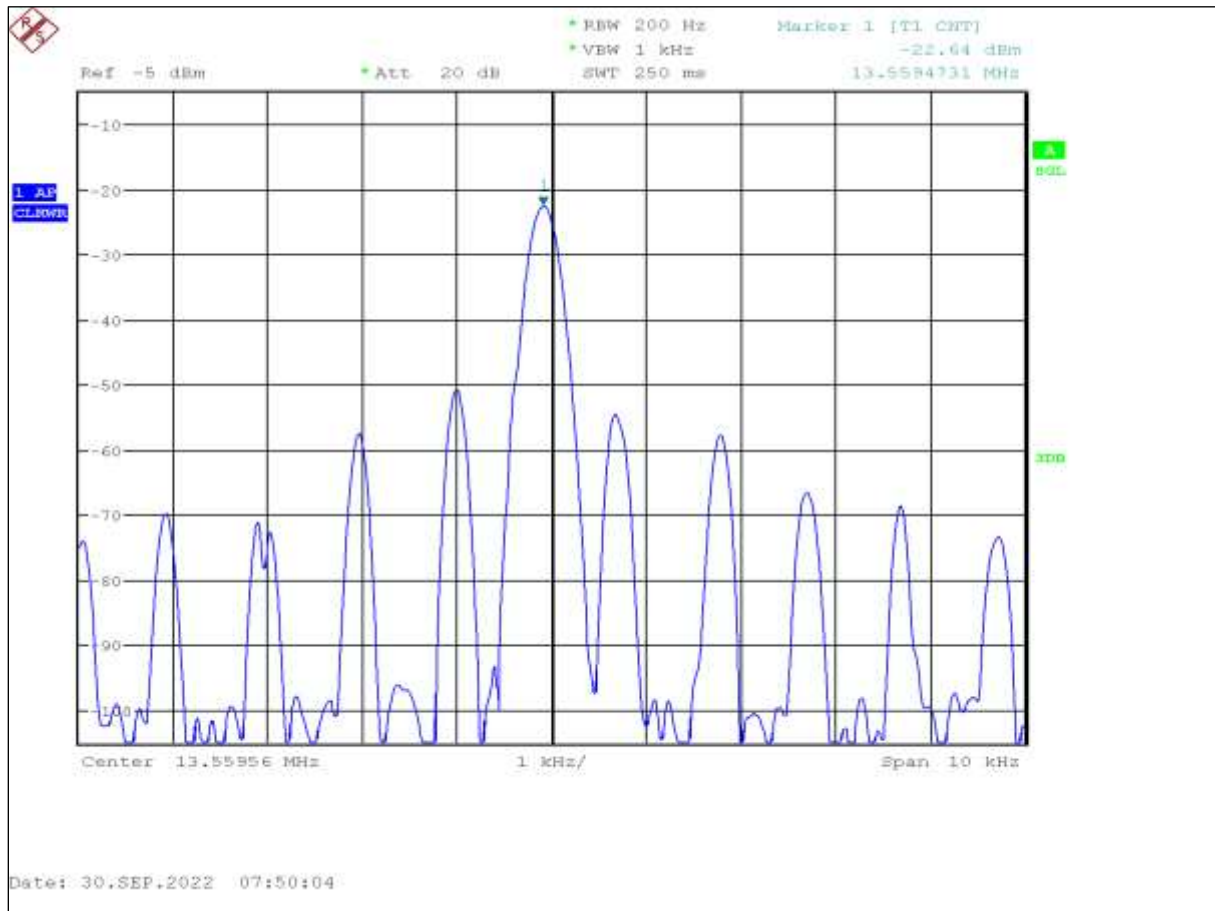
T21_V10_2



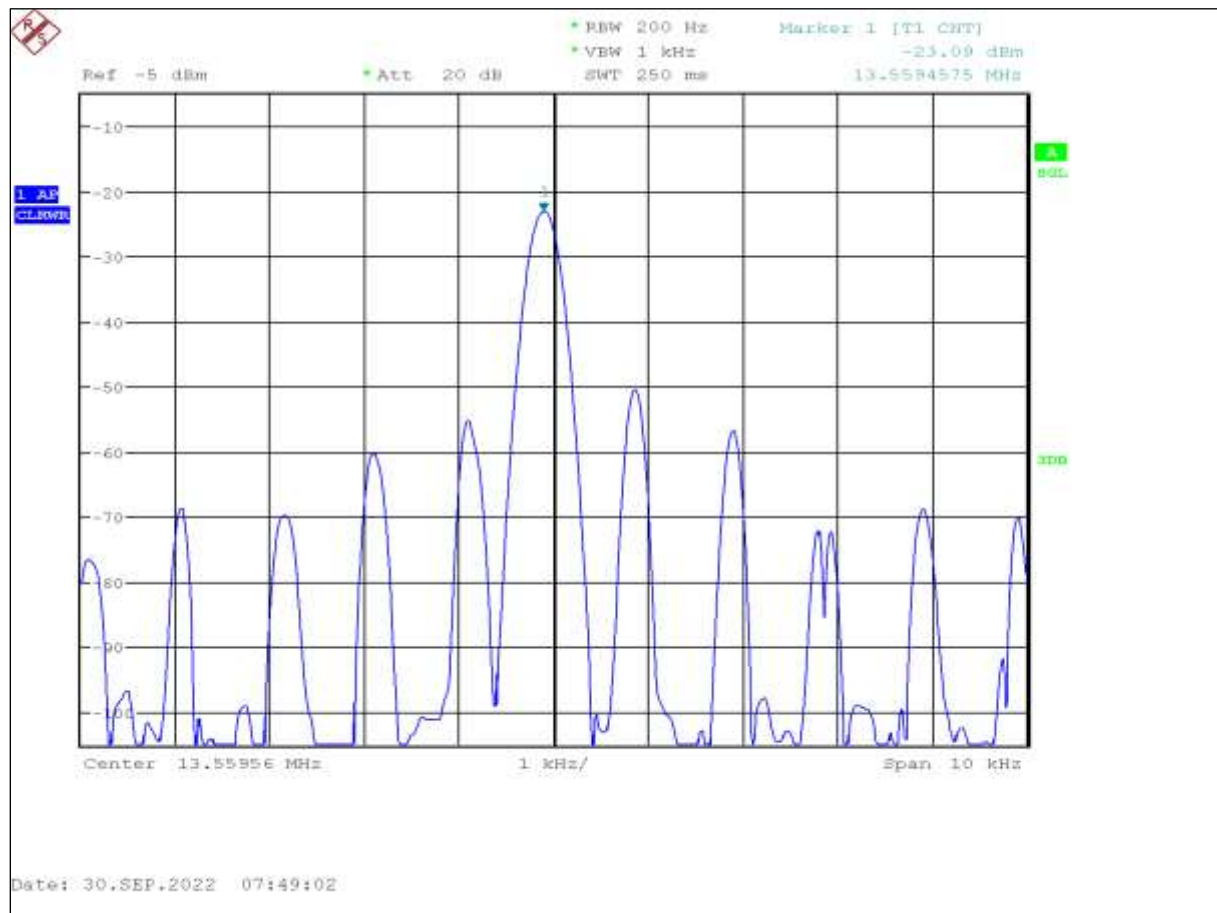
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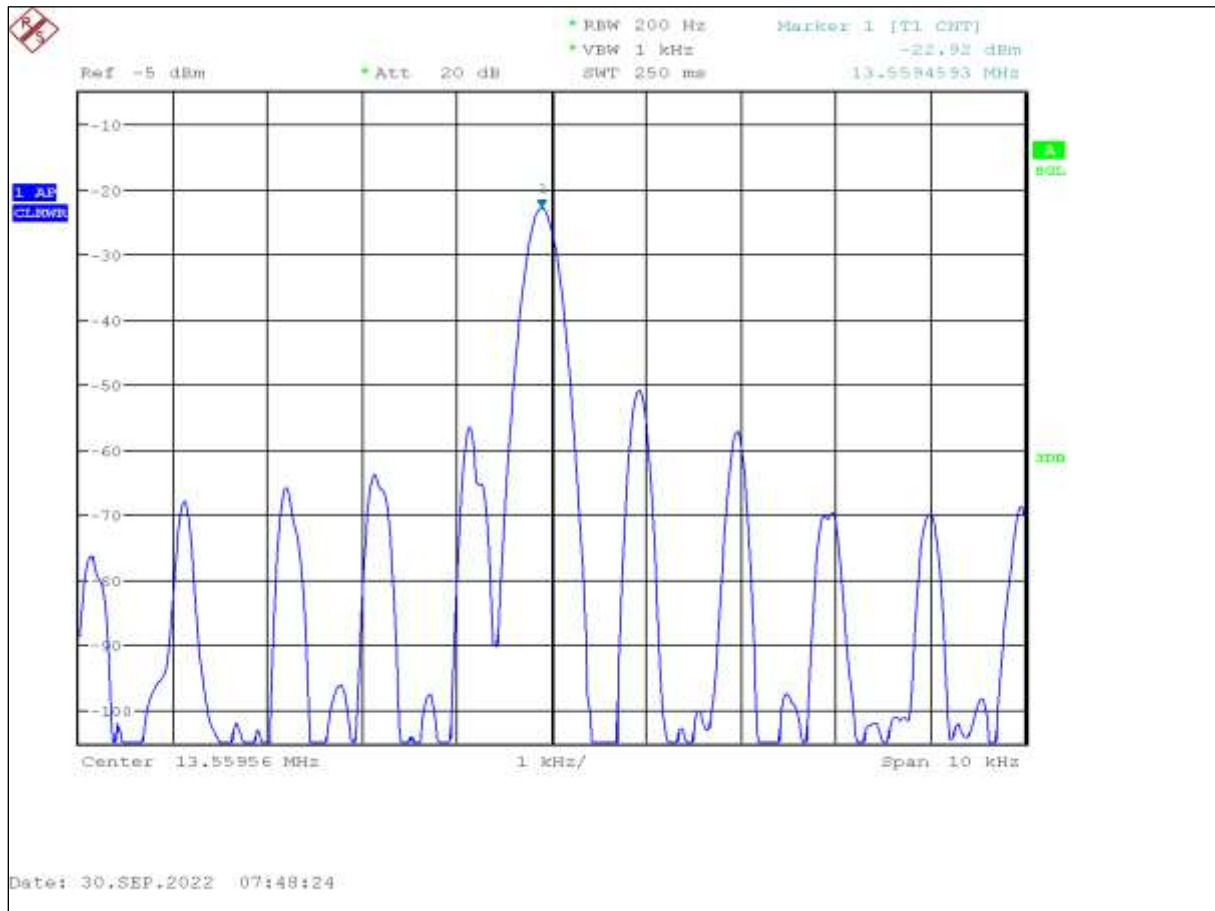
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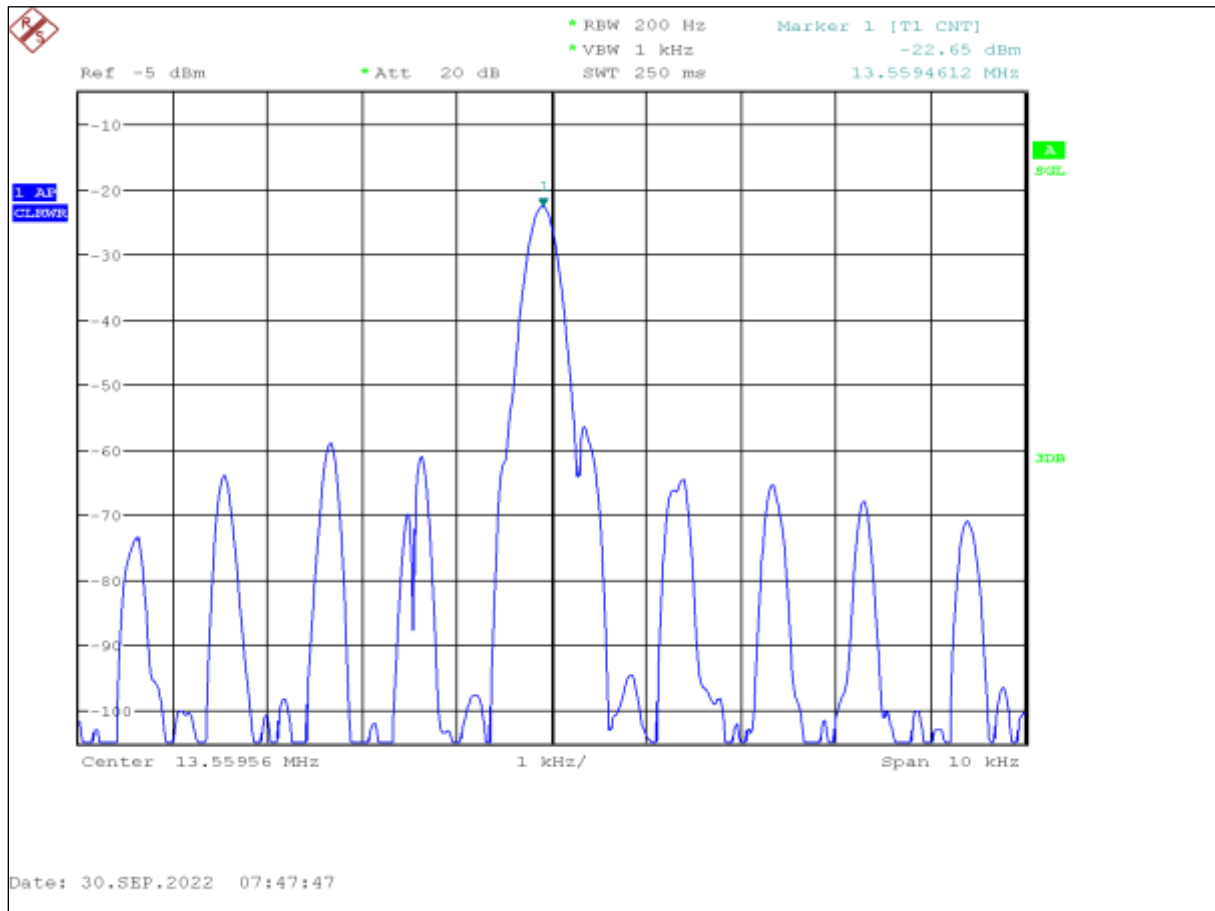
T21_V11_1



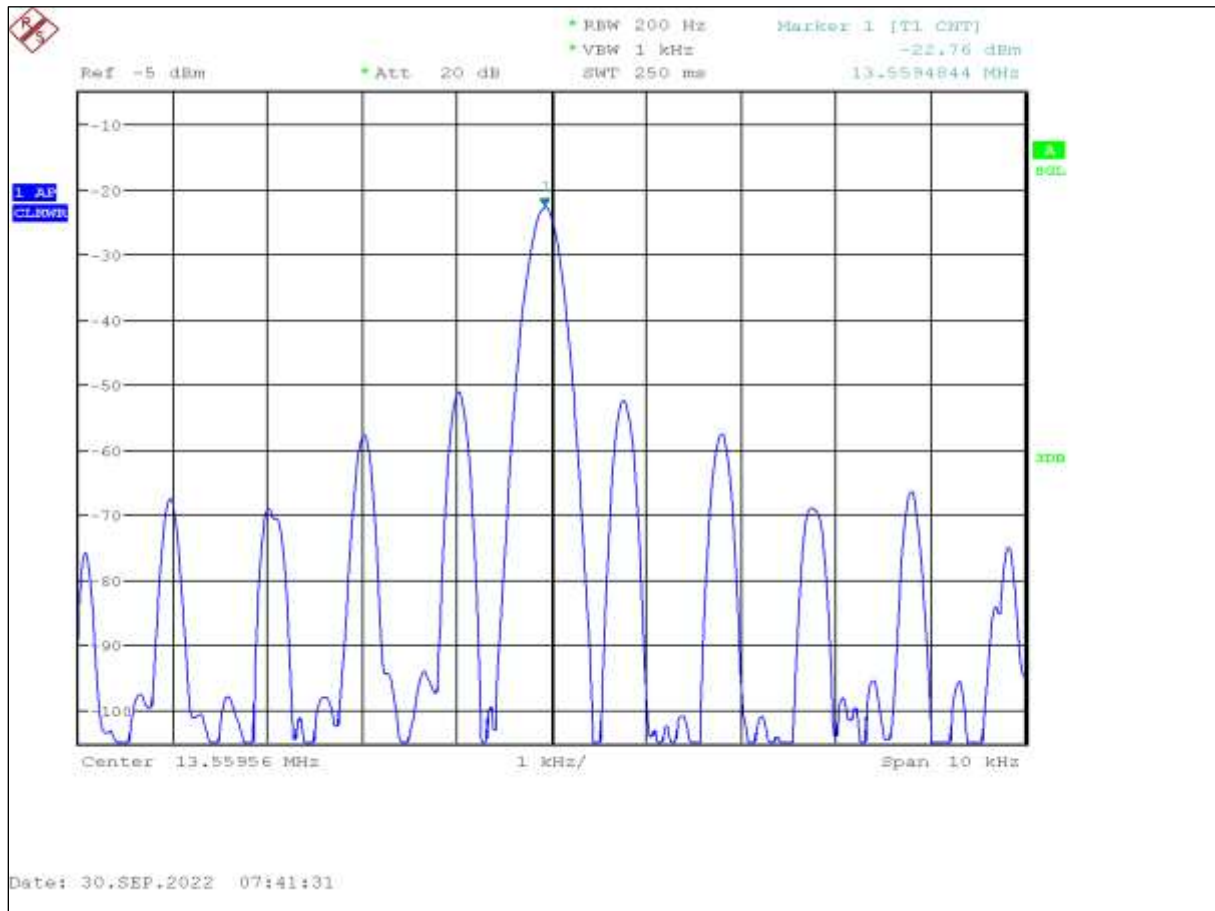
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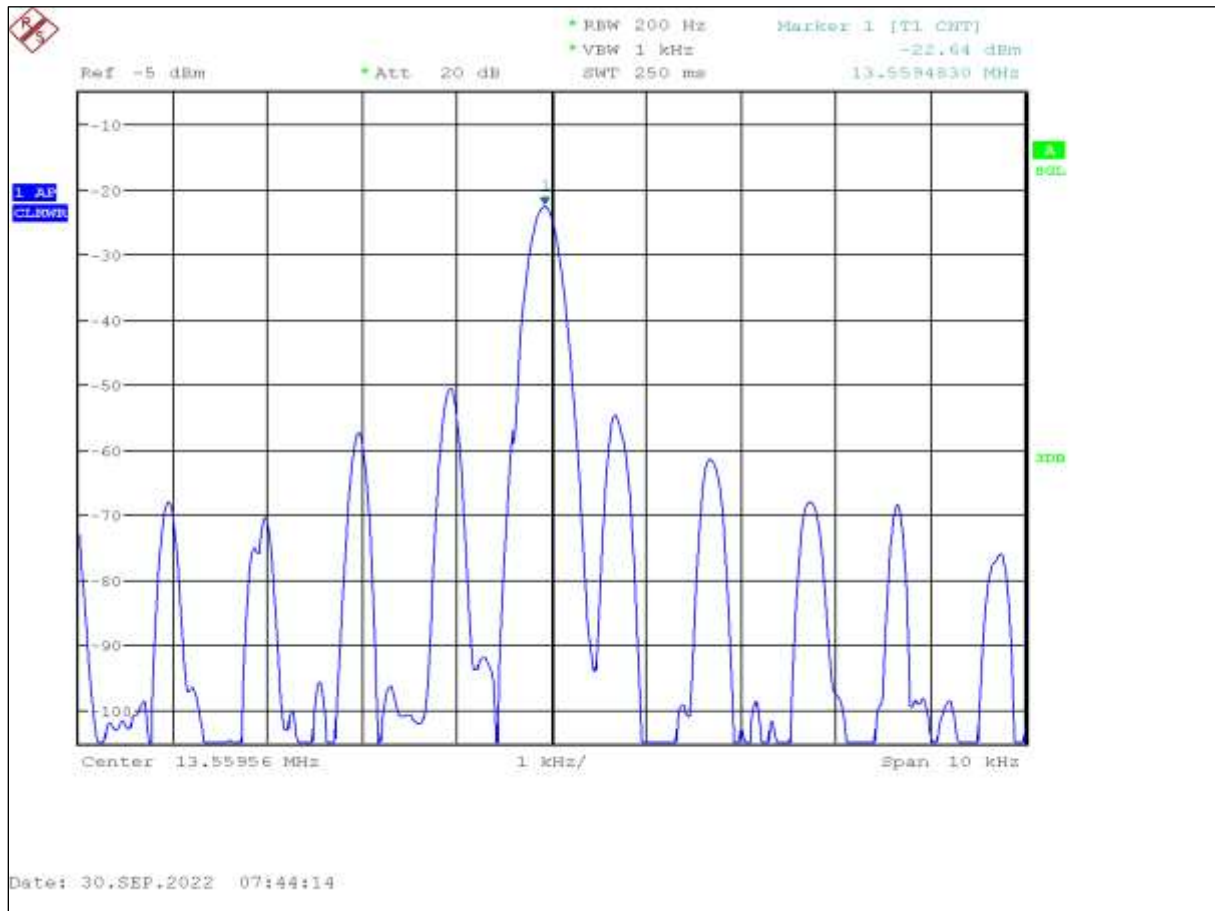
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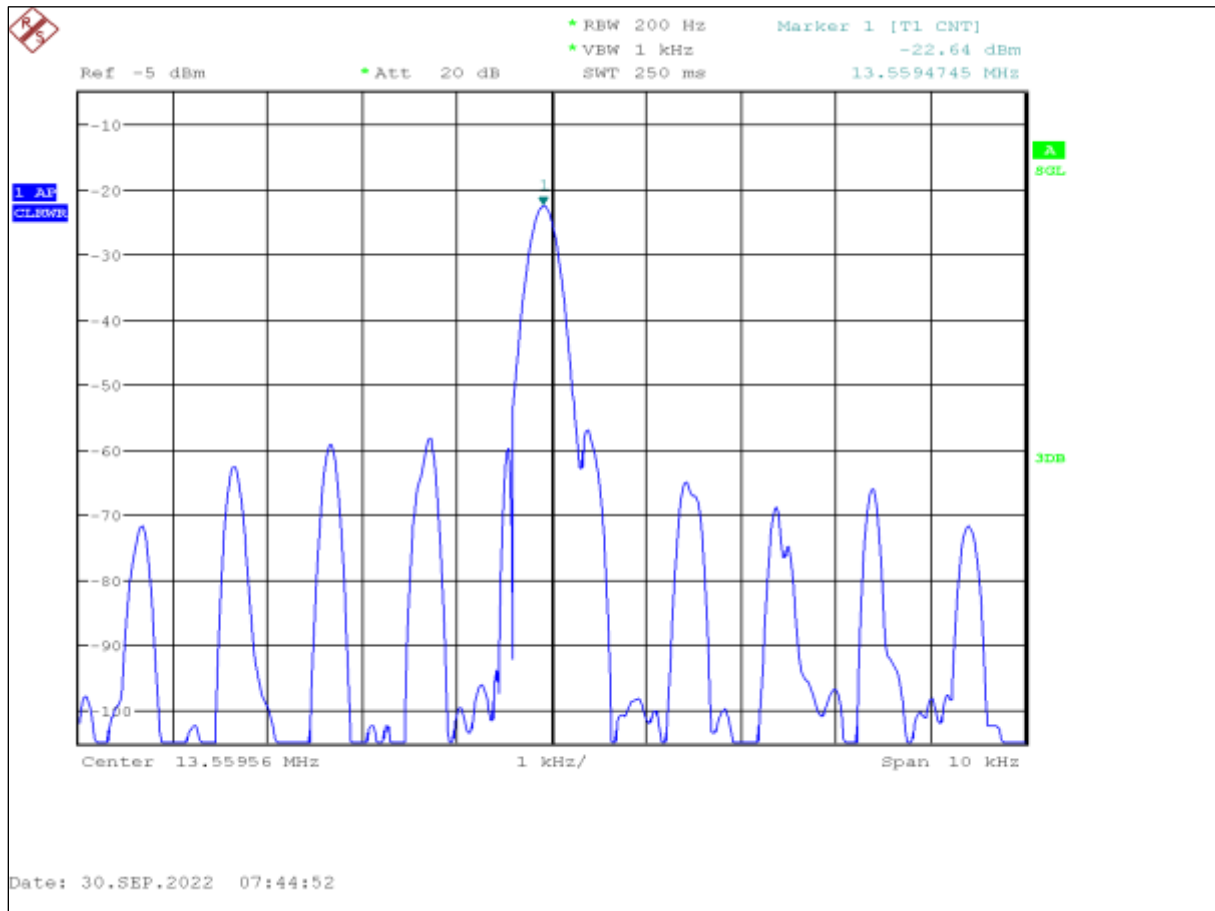
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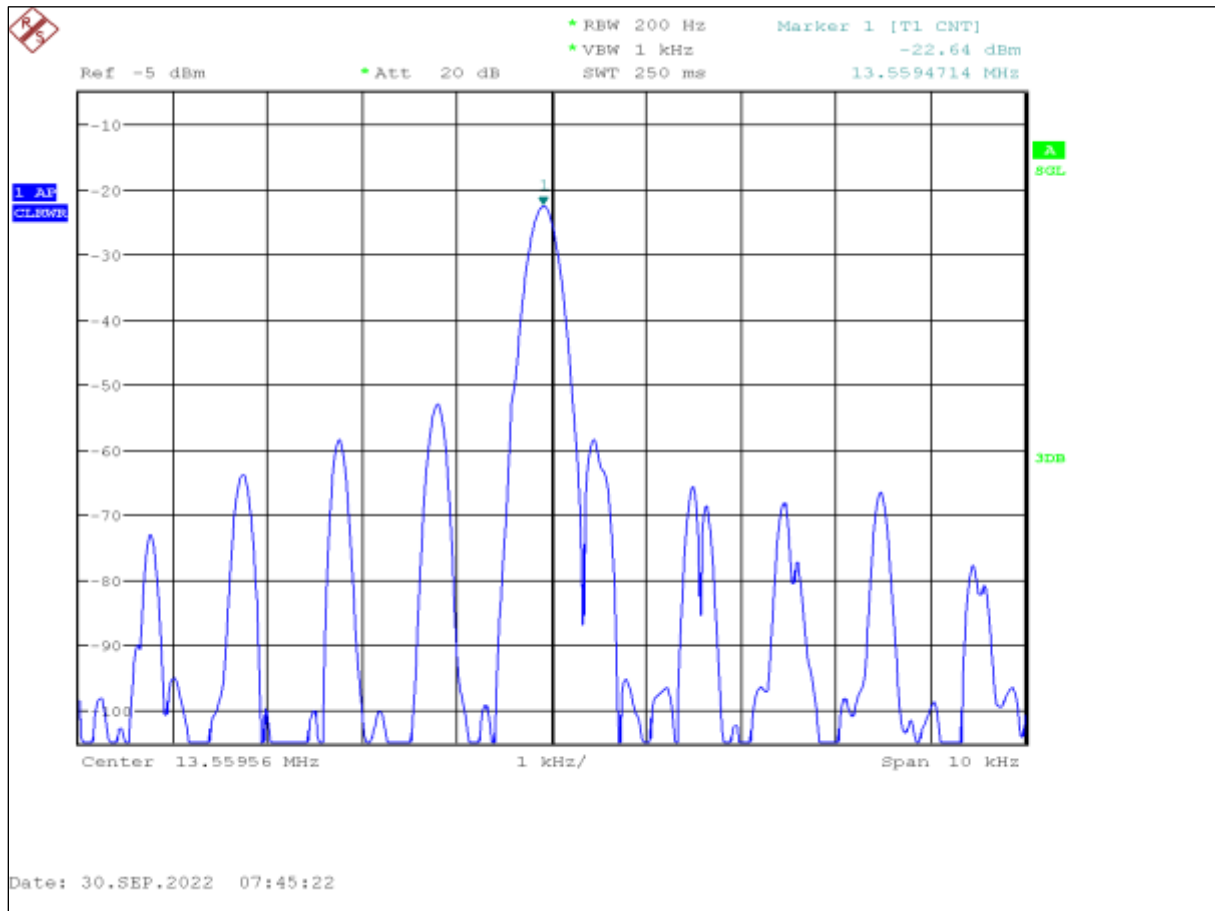
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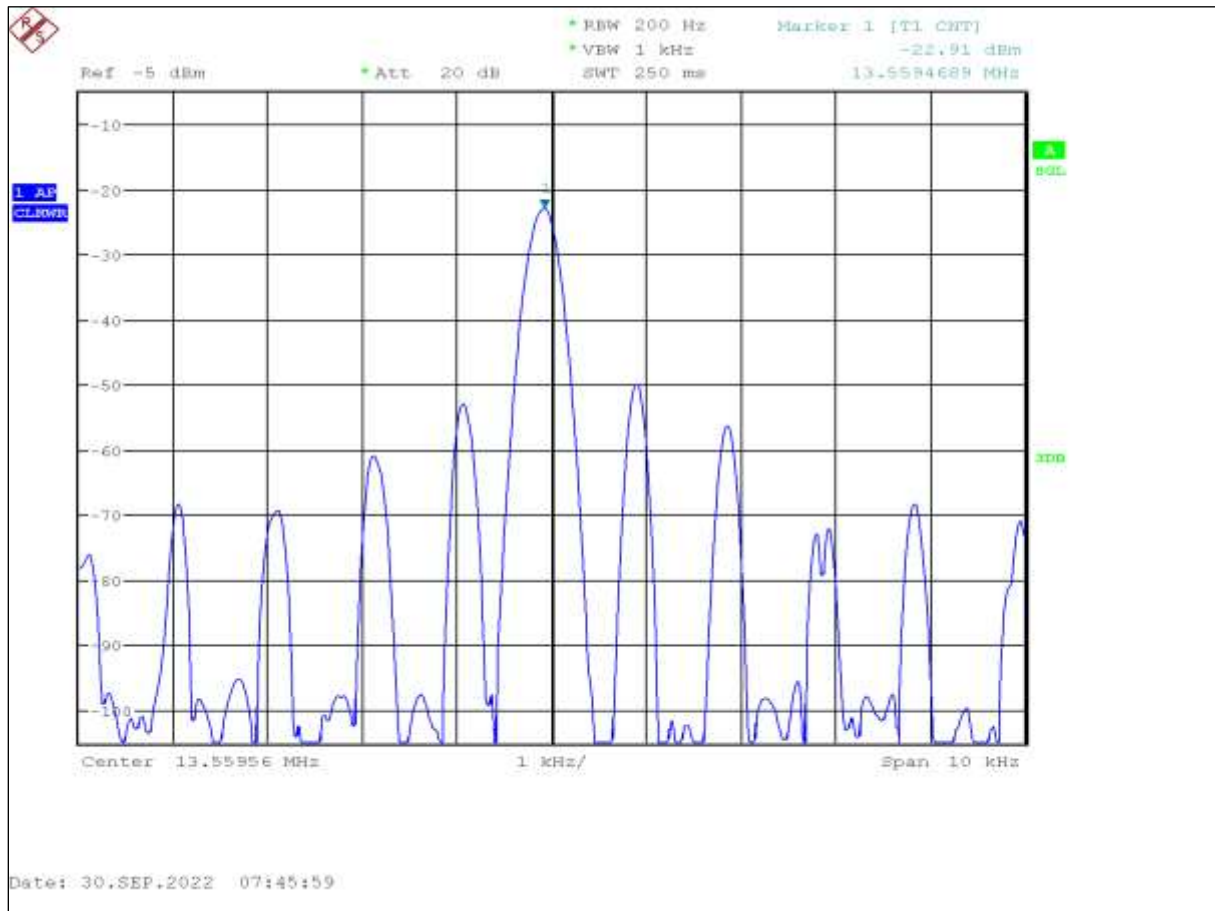
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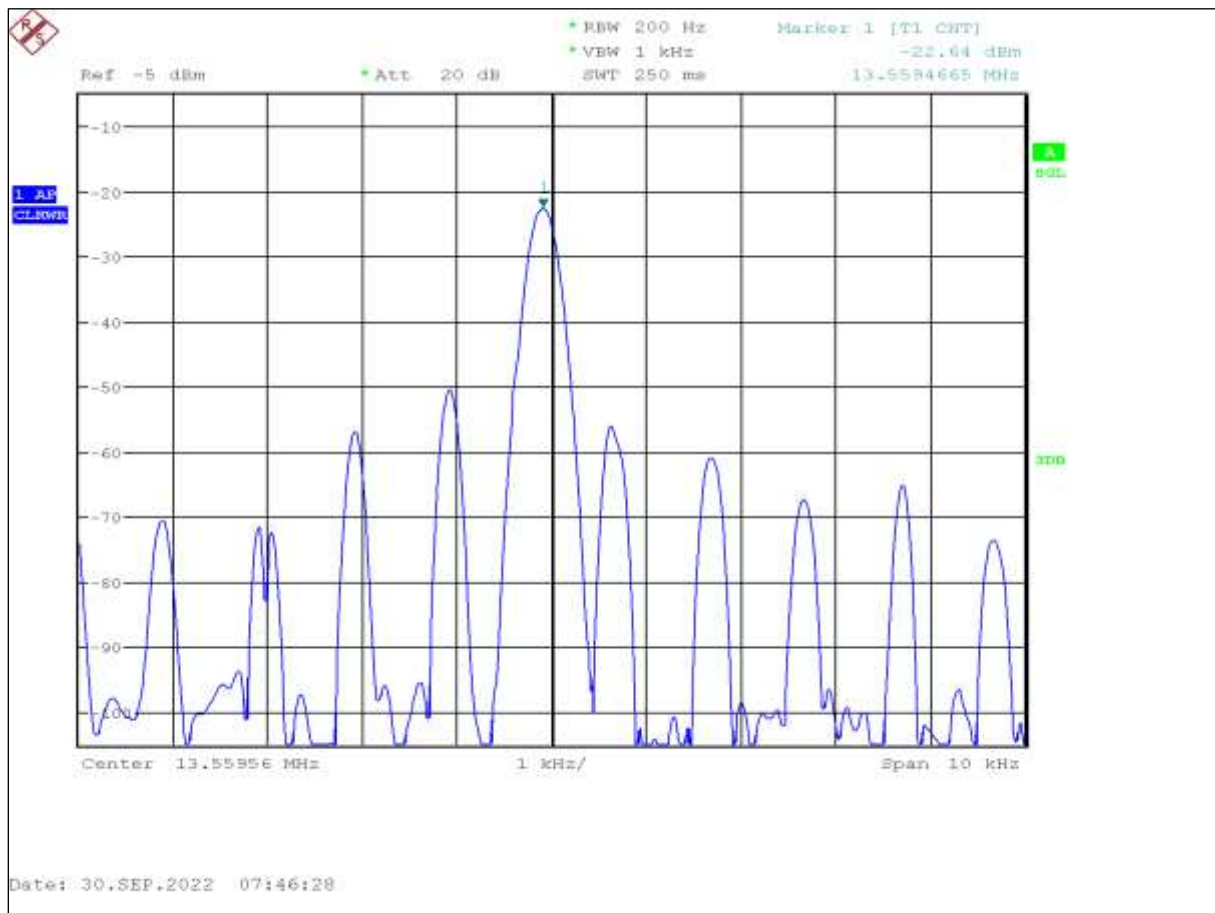
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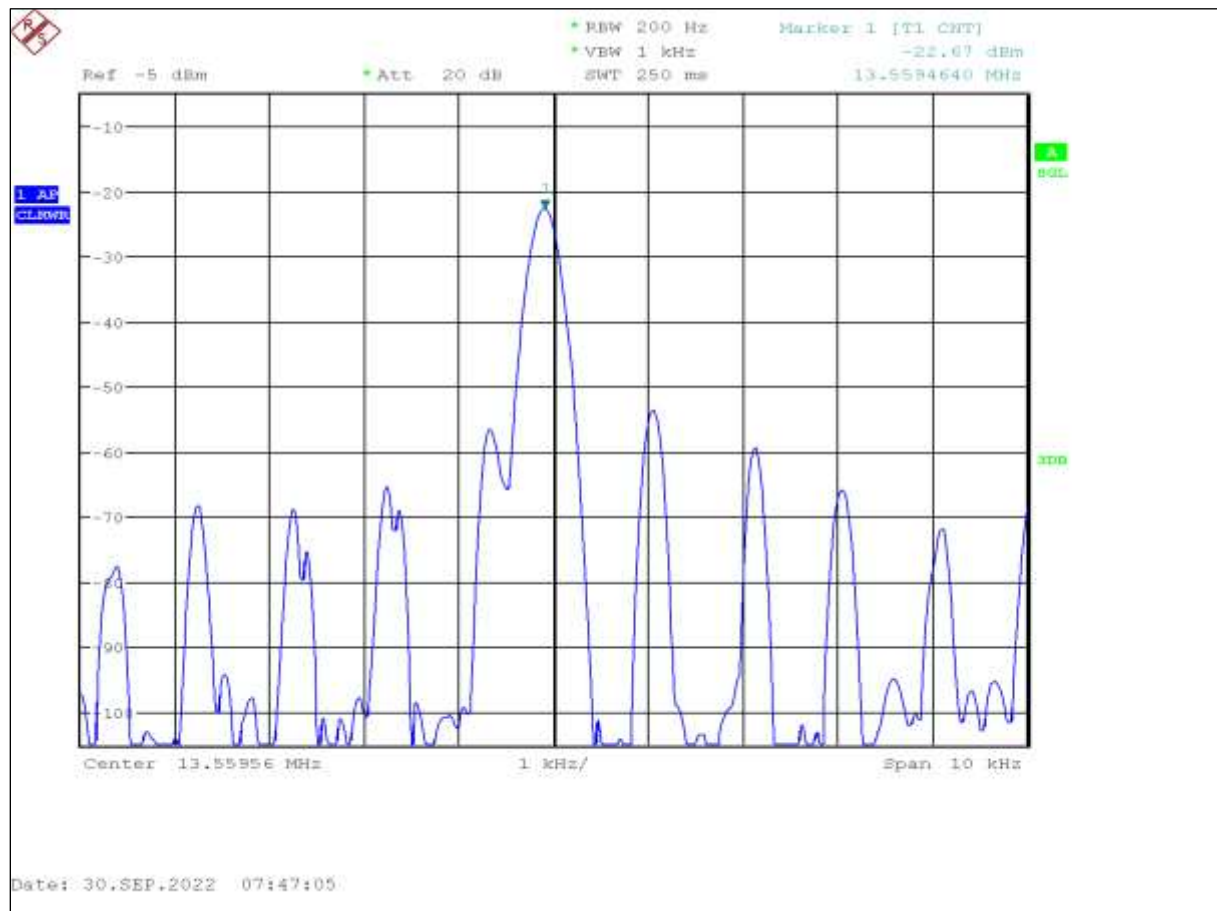
T21_V13_2



T21_V13_5



T21_V13_8



End Of Annex 1